AMERICAN GAS ASSOCIATION MONTHLY

Vol. V No. 2

FEBRUARY, 1923

DO not separate yourself from plain people; be one with all—be universal.

—ELBERT HUBBARD.

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FOR STATEMENTS AND OPINIONS CONTAINED IN PAPERS AND DISCUSSIONS APPEARING HEREIN, THE ASSOCIATION DOES NOT HOLD ITSELF RESPONSIBLE

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American Gas Association Monthly

Vol. V FEBRUARY, 1923 No. 2

One's Own House

To raise the question of a man not knowing his own house, its size, its appearance, the ground that it covers, sounds incredibly foolish. Possibly, most men would at once become indignant at even the implication of such ignorance.

Has he not lived there all his life? Is it not **his** home? He could walk therein blindfolded, so familiar is he with it all.

But how often it is, that just those things that are so familiar—by their very familiarity—escape the detailed analysis which is so necessary for the thorough realization of what their true value is,—so necessary to bring out their true perspective.

Realization—thorough realization—that is what is so often defeated by this everyday familiarity. Realization of what our house is, as compared to those of our neighbors.

Possibly, every gas man can quote glibly the latest figures of billions of cubic feet of gas sold, miles of gas mains under the ground, thousands of uses of gas and all the other figures, just as he can recite the number of rooms in that other home of his, with their furnishings, size and location.

But how about his neighbor's home? How does it compare with his?

Does every gas man know the relation of the $15,000,000,000 invested in ours—the utility industry—to the corresponding figure of some of our neighbor's undertakings? Does he realize the vastness of the ground area covered by his own house as compared with some of our neighbor's edifices?

Possibly it will astonish him to know that this means that his house is some four times larger than that of the steel industry; some eight times larger than that of the automobile industry; some ten times larger than that of the ship-building industry; some twelve times larger than that of the meat packing industry and some fifteen times larger than that of the paper industry.

If he does realize this, it should kindle even brighter the glow of pride in his life's work; it should make him even more determined than ever to justify the greatness of his industry by striving to make its service live up to the dimensions of the house.

AMERICAN
GAS ASSOCIATION
MONTHLY

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A Century of Growth in the Gas Industry

H. W. HARTMAN, Secretary, Accounting Section, A. G. A.

THE history of any industry is marked by certain distinct periods which are characteristic of various stages of its development.

First comes the early struggle to perfect manufacturing methods and to develop a demand for the product; next the initial period of expansion,—limited by the original conception of the uses to which the product can be put; then the development of new uses for the product, the struggle with competing products, the expansion of the territory supplied,—all add their influence to the sum total of the industry's growth.

The rapidity of this growth and its permanence of course depend upon the necessity for universal appeal of the product. But even taking this into consideration, no industry has shown a healthy, permanent development, that has not been blessed with sufficient breadth of vision to surmount the apparent limitations of the moment.

At *every* stage of the development of *every* industry there are those both within and outside its organization who speak of the "point of saturation," who feel that everything has been done that can be done,—and who see the "beginning of the end." Fortunately for the gas industry it has always numbered among its leaders men who have had the vision to see and the courage to develop new fields for the expansion of its product. Even today after more than a century of development, this vision and courage are looking forward to new uses for gas,—in the industrial field, in the development of the house-heating load,—and are laying the basis for adjustments in manufacturing and distribution methods which may be necessary for the full development of these fields.

That these new uses may require changes in methods has not blinded these leaders to the possibilities involved in the larger demands for service the future will make on our industry. That is the spirit that has made possible the phe-

nomenal growth of the past century and insures for the future that faculty of adjustment to the needs of current progress which is essential if the industry is to have a *permanent* growth worthy of its past.

The American Gas Association feels that its members realize the extent to which our industry has prospered under such leadership, but it is doubtful if *many* realize how greatly our growth has accelerated in the last decade and what promise this holds for the immediate future.

To show this great expansion and to indicate the healthy and permanent growth the industry has had since its inception, the Association has prepared statistics showing the annual sales of gas every ten years from 1821 to 1921. The first table following shows the annual sales for the particular year indicated. For the earlier years in the table it has been possible to supplement and check so completely the government census figures, with contemporaneous data in directories, trade papers, individual company records, etc., as to insure the relative acuracy of the figures given:

ESTIMATED ANNUAL SALES OF GAS IN THE UNITED STATES FROM 1821 to 1921.

	Annual Sales Thousand Cubic Feet	Amount of Increase per decade Thousand Cu. Ft.
1821	——	——
1831	140,000	140,000
1841	400,000	260,000
1851	1,200,000	800,000
1861	4,000,000	2,800,000
1871	10,700,000	6,700,000
1881	23,500,000	12,800,000
1891	45,000,000	21,500,000
1901	101,626,000	56,626,000
1911	159,101,000	57,475,000
1921	326,951,000	167,850,000

From the above it will be noted that the amount of increase in the annual sales of gas for the period 1911 to 1921 (167,850,000 M. cu. ft.) is greater than the *sum* of the increases shown for *all* preceding decades since the inception of the industry.

The *increase* in sales for the period ending 1921 is greater than the *total annual sales* for 1911, the first year of this period.

During none of the ten year periods recorded has the amount of increased sales failed to be progressively greater than the increase shown for the preceding period. For the period ending 1921 this increase (167,850,000 M. cu. ft.) is practically triple the amount of the increase for the preceding decade—a greater proportionate advance than is shown for any decade back to the year 1861.

The foregoing table gives the annual sales for the last year in each decade. It was desired to go further than this and determine how the *total* sales for the last ten years compared with the total sales for previous decades. Accordingly, the second table given below was made up by adding together the sales for each year in the periods shown giving the *total* sales for each decade. Please note that six ciphers have been dropped, the figures representing million cubic feet:

ESTIMATED TOTAL SALES OF GAS FOR THE TEN YEAR PERIODS (1872-1881) (1882-1891) (1892-1901) (1902-1911) (1912-1921)

	Total Sales Million Cu. Ft.
Period 1872-1881 Inclusive	178,700
Period 1882-1891 inclusive	334,300
Period 1892-1901 inclusive	763,725
Period 1902-1911 inclusive	1,269,846
TOTAL SALES FOR ABOVE FOUR DECADES	2,546,570
Period 1912-1921 inclusive	2,490,602

How many of us have realized the growth of the last ten years—that the gas sold in this decade is practically equal

to the total sales for the *preceding forty years!*

Only an industry alive to its own possibilities, prompt to adjust itself to the many demands of a period of immense industrial expansion, and providing a product preeminent among its competitors in fulfilling the exacting requirements of our present day conception of service could have enjoyed an expansion such as this. How could anyone fail to realize with these figures before him, the possibilities which the future holds for our further development? Could anyone have predicted in 1831,—when our total sales (140,000,000 cu. ft.) were devoted entirely to illumination,—that in 1921 22% of our sales, (over 70 billion cu. ft.) would be sold for industrial purposes; and that only 18% of the sales would be devoted to illumination, the only use known to the gas man of 1831?

How can anyone, realizing the many advantages inherent in gas as a heating medium fail to weigh carefully at this time the possibilities of developing a house-heating load, of expanding their water heater sales, of extending the industrial uses of gas to a point as little thought of now as was our present development in the mind of the gas man of 1831, 1841 or even 1901? Certainly our present operations would not be possible with the methods of the past nor could our future development proceed without that vision and courage which has enabled us to adjust those methods to the demands of the increasing and diversified applications of gas.

Below is given a table prepared by the U. S. Geological Survey showing salient statistics covering the natural gas industry. It is of particular importance to notice from these data that the natural gas production in the United States in 1921 was 136,000,000,000 cu. ft. less than the preceding year. Such decreases mean

Table 1—Salient figures of the Natural Gas Industry

	1919	1920	1921
Gas produced (M)	798,823,000	860,540,000	724,052,000
Disposition of the gas (M):—			
For domestic purposes	255,743,000	286,001,000	248,334,000
For carbon black manufacture	49,896,000	40,599,000	50,565,000
For gasoline extraction (a)	21,310,000	18,311,000	19,755,000
For drilling and pumping	148,477,000	183,797,000	162,550,000
For other industrial purposes	270,490,000	269,502,000	180,848,000
Reported waste	52,907,000	62,330,000	62,000,000
Number of consumers:			
Domestic	2,501,462	2,615,043	2,630,915
Industrial	24,387	20,925	20,989
Annual consumption per consumer (M)			
Domestic	102	109	94
Industrial	20,100	24,477	19,711
Value of gas consumed:	$160,888,000	$196,194,000	$174,617,000
For domestic purposes	$ 88,414,000	$109,302,000	$110,337,000
For industrial	$ 72,474,000	$ 86,892,000	$ 64,280,000
Average value of gas (cents per M)	21.6	24.6	26.4
By-products of natural gas:			
Natural gas gasoline (gallons)	351,500,000	384,700,000	449,980,000
Market value	$ 64,197,000	$ 71,788,000	$ 61,815,000
Average value of natural gas gasoline (cents per gallon)	18.3	18.7	13.7
Carbon black produced	52,100,000	51,300,000	59,800,000
Market value	$3,816,000	$4,032,000	$5,446,000
Average value (cents per pound)	7.3	7.9	9.1

(a) This figure represents actual decrease in volume of gas treated for gasoline.

that corresponding increases in output of manufactured gas should occur in order to preclude the return of natural gas users to other fuels, such as coal, oil, etc.

Our century of growth is a subject for congratulation and an augury for the future. But we commend these figures to the thoughtful consideration of our members most particularly as an indication of the rapid changes of the last ten years and the possibility of the still greater demands that may be made on our capacity for growth and development in the immediate future.

Accounting Service Bureau of the Wisconsin Utilities Association

This Association has recently formed an Accounting Service Bureau under the directorship of Karl F. McMurry, who is a Certified Public Accountant with an extensive experience and a recognized authority on Federal Income Tax matters. In addition, he has made an extensive study of public utility accounting.

The Association plans, through this bureau, to give as much service to member companies, without extra charge, as possible. The new bureau's office will be located at the office of John N. Cadby, the Executive Secretary of the Association, at 445 Washington Building, Madison, Wisc. The service will include—detection of accounting errors, instructing new bookkeepers, making up of Federal Income Tax reports for companies, auditing of books. In the case of work entailing a visit to the applicant's offices, a nominal charge for this service is to be made. For personal accounting services, a charge of actual cost to the Association will be made.

New Members

GAS COMPANIES

Ludington Gas Company,
Charles N. Remington, Pres.,
Grand Rapids, Michigan.

Garden City Gas Co.,
Robert C. Cardell, Manager,
Missoula, Montana.

Gastonia & Suburban Gas Company,
C. C. Cornwell, Jr.,
Gastonia, N. C.

Concord & Kannapolis Gas Company,
J. S. Palmer, Gen. Mgr.,
Concord, N. C.

The Ottawa Gas Company,
D. D. Dion, Gen. Mgr.,
Ottawa, Canada.

MANUFACTURERS

Peerless Heater Company,
Thomson King, Sales Mgr.,
Pittsburgh, Pa.

GENERAL

CHAIRMEN OF GENERAL COMMITTEES ORGANIZED TO DATE

Accident Prevention—F. W. Fisher, Rochester, N. Y.

Amendments to Constitution—Wm. J. Clark, Mt. Vernon, N. Y.

American Engineering Standards Committee, Representative on—A. H. Hall, New York, N. Y.—(Alternate Representative) W. J. Serrill, Philadelphia, Pa.

Representatives on Sectional Committees—Underground Construction—National Electrical Safety Code—C. C. Simpson, New York, N. Y. Illumination, Nomenclature and Photometric Standards— W. J. Serrill, Philadelphia, Pa. Ventilating Code—Geo. E. Bennitt, New York, N. Y. Safety Code Correlating Committee—W. R. Addicks, New York, N. Y.—(Alternate Representative) Donald McDonald, New York, N. Y.

Chamber of Commerce—D. D. Barnum, Boston, Mass.

Cooperation with Educational Institutions—C. N. Chubb, Davenport, Ia.

Finance—James Lawrence, New York, N. Y.

Gas Safety Code—W. R. Addicks, New York, N. Y.

Gas Standards—J. B. Klumpp, Philadelphia, Pa.

Geographic Sections—L. R. Dutton, Jenkintown, Pa.

National Fire Protection Association—R. S. Doull, New York, N. Y.

Nominating—C. M. Cohn, Baltimore, Md.

Rate Fundamentals—R. A. Carter, New York, N. Y.

Standard Gas Appliance Specifications—W. T. Rasch, New York, N. Y.

United States National Committee of International Commission on Illumination, Representative on—Howard Lyon, Gloucester, N. J.

Second Short Course in Gas Meter Testing and Repairing at Iowa State College

A SECOND "Short Course" for gas repair men has recently been successfully conducted by the Engineering Extension Department of the Iowa State College in conjunction with the Iowa District Gas Association. The course was held in the chemistry building of the State College at Ames, Iowa, December 5th to 8th inclusive, and was attended by nearly seventy men.

The instructing staff and general plan of the course were much the same as that of the first "Short Course" held last year. The only noteworthy changes were the more practical nature of the course and the conducting of part of the demonstrations and discussions in a separate room from that devoted to shop work, so that both could be carried on simultaneously. By this arrangement, it was possible to give the inexperienced men the larger amount of instruction in testing and repairing that they needed without interfering with the discussions and demonstrations desired by the more experienced men. Another change along the same line that proved of value was the assigning of a thoroughly experienced instructor to each group of two men to instruct them in each particular part of the work. The ratio of experienced men to those desiring instruction was such that it was possible to carry out this arrangement very successfully without working a hardship on those acting as instructors.

As no small portion of the men attending the course came from small gas companies doing either little or no testing or repairing, and attended specifically to get sufficient instruction to enable them to do this work, it was essential that the course be so arranged as to give them the fundamental instruction necesary to do this work intelligently.

The program of the course was as follows:

Tuesday, December 5th

8:30 A. M.-10:30 A. M. Registration, Room, 192, Chemistry Bldg.

10:30 A. M.-10.45 A. M. Opening of Course. W. H. Meeker, Prof. Mechanical Engrg., Iowa State College.

10:45 A. M.-11:30 A. M. Outline of Course. D. P. Allen, Supt. Distribution, Des Moines Gas Company.

1.00 P. M.-1:30 P. M. Meter Proving. A. F. Barrett, American Meter Co., Chicago, Ill.

1:30 P. M.-3:00 P. M. Proving and Adjusting Tin Case Meters. Geo. A. Lane, Supt. Meters, Peoples Gas Light & Coke Co., Chicago.

7:30 P. M.-8:00 P. M. Tin Case Meter Construction and Action, C. E. Stahl, Asst. Mgr., Peoples Light Co., Davenport, Iowa.

8:00 P. M.-8:30 P. M. The Metric Iron Case Meter Construction. Eugene Metz, Representative of Metric Metal Works.

8:30 P. M.-9:30 P. M. Sprague "1A" and "D" Type Iron Case Meters. Construction and Action. E. C. Falvey.

Wednesday, December 6th

8:30 A. M.-10:00 A. M. Major Repairs of Tin Case Meters. Demonstration and Explanation. Geo. A. Lane.

10:00 A. M.-11:30 A. M. General Repairs, Sprague 1-A Meter. Demonstration and Explanation. E. C. Falvey.

1:00 P. M.-2:00 P. M. General Repairs, Metric Iron Case Meters. Eugene Metz.

1:00 P. M.-5:00 P. M. Shop Work. For those preferring practice in meter testing and repairing.

2:00 P. M.-2.45 P. M. "Four Pointing." Geo. A. Lane.

2:45 P. M.-3:30 P. M. Open for Special Subjects.

3:30 P. M.-5:00 P. M. Bottling a Meter Prover. A. F. Barrett.

Thursday, December 7th

8:30 A. M.-9:30 A. M. Meter Records, Robt. F. Galpin, Supt. Distribution, Muscatine Lighting Company.
Frank Duncan, Meter Record Clerk, Des Moines Gas Co.

9:30 A. M.-10.30 A. M. Meter Shop Lay-Out and Organization, M. S. Tays, Foreman Meter Department, Metropolitan Utilities Dist., Omaha.
George Beattie, Shop Foreman, Des Moines Gas Company.

10:30 A. M.-11:30 A. M. Handling and Installing Meters, C. E. Stahl.

1:00 P. M.-5:00 P. M. Meter Shop Kinks, Devices and Processes. Open Meeting.

1:00 P. M.-5:00 P. M. Shop Work.

Friday, December 8th

8:30 A. M.-10:00 A. M. Question Box. Meter Troubles, D. P. Allen, Chairman.

10:00 A. M.-11:00 A. M. Plan for Next Year's Course, D. C. Faber, Chairman.

1:00 P. M. -5:00 P. M. Shop Practice. (See Schedule).

Mr. Geo. A. Lane, Supt. of Meters, Peoples Gas Light & Coke Co., Chicago, had general supervision of the work of instruction, having Mr. W. M. Rosenia of his meter shop to assist him in demonstrating repair work. Mr. Alfred Barrett, of the American Meter Company, with his assistant, Frank Kepschull, directed the instruction in tin-case meter proving and repairing. Mr. Edward C. Falvey, of the Sprague Meter Co., directed the instruction in Sprague Meter proving and repairing as well as demonstrating the Sprague 1-A and D type of meters.

Quite a few gas company managers and gas distribution superintendents and foremen attended the course and took an

active part in the various discussions, especially those dealing with meter records, repair costs, shop organization and meter repair and test work, as it affected general distribution practice. It is believed that the course proved of as much value to these men as it did to those interested mainly in meter testing and repairing.

Various types of meter connections, house governors and different makes of meters were on exhibition, as well as meters showing peculiar conditions of corrosion or deposits. These proved to be of considerable interest.

Both the American and Sprague Meter Companies contributed largely to the success of the course through the equipment that they furnished and through their representatives who served on the instructing staff.

The booklet "Outlines of Instruction in the Testing and Repairing of Gas Meters" that was published after the first "Short Course" proved quite useful in supplementing the verbal instruction. This booklet covers the construction, testing and repairing of both tin-case and cast iron meters and is partly original material developed during the first "Short Course" and partly of abstracts from Forstall's "Manual of Gas Distribution," the 1920 Report of the Consumers' Meters Committee of the A. G. A. and abstracts from various meter company catalogs and publications.

A second edition of this bulletin is to be published soon and will be available for general distribution and may be obtained either from the Engineering Extension Department of the Iowa State College or from Mr. H. R. Sterrett, Secretary-Treasurer of the Iowa District Gas Association, and Engineer of the Des Moines Gas Company. Additional material developed during the second "Short Course" will be included in the publication and certain changes made in the material contained in the first edition.

The entertainment features of the course were a smoker at the Ames Chamber of Commerce, Wednesday evening, and a banquet Thursday evening.

It is believed by those familiar with the situation that the "Gas Meter Short Course" fills a very definite and important educational requirement and is well worth continuing. Plans are already being made for a third "Gas Meter Short Course" this coming year.

Southern Gas Association Meeting

The annual meeting of the Southern Gas Association will be held at St. Petersburg, Florida, on April 16, 17 and 18. As an added attraction to the excellent program to be provided, a trip to Havana is planned, immediately following the close of the Convention. Further details of this may be secured from J. D. Taylor, 42 Osborne Avenue, Catonsville, Md.

Associations Affiliated with A. G. A.

Canadian Gas Association
Date of Affiliation—Mar. 25, 1919
Pres.—Col. D. R. Street, Ottawa Gas Co., Ottawa, Ont., Can.
Acting Sec.-Tr.—E. A. Hills, Consumers' Gas Co., Toronto.
Conv., 1923.

Empire State Gas and Electric Association
Date of Affiliation—Nov. 21, 1919
Pres.—M. J. Brayton, Utica Gas & Electric Co., Utica, N. Y.
Sec.—C. H. B. Chapin, Grand Central Terminal, New York, N. Y.
Conv., 1923.

Illinois Gas Association
Date of Affiliation—Mar. 19, 1919
Pres.—R. S. Wallace, Central Illinois Light Co., Peoria, Ill.
Sec.-Tr.—R. V. Prather, 305 Illinois Mine Workers Bldg., Springfield, Ill.
Conv., Sherman Hotel, Chicago, Ill., March 1923.

Indiana Gas Association
Date of Affiliation—April 24, 1919
Pres.—F. B. Tracy, Central Indiana Gas Co., Muncie, Ind.
Sec.-Tr.—E. J. Burke, Citizens Gas Co., Indianapolis, Ind.
Conv., West Baden Springs Hotel, West Baden, Ind., May, 1923.

Iowa District Gas Association
Date of Affiliation—May 21, 1919
Pres.—H. B. Maynard, Citizens Gas & Electric Co., Waterloo, Ia.
Sec.-Tr.—H. R. Sterrett, Des Moines Gas Co., Des Moines, Ia.
Conv., April, 1923.

Michigan Gas Association
Date of Affiliation—Sept. 18, 1919
Pres.—Fred W. Seymour, Battle Creek Gas Co., Battle Creek, Mich.
Sec.-Tr.—A. G. Schroeder, Grand Rapids Gas Light Co., Grand Rapids, Mich.
Conv., 1923.

Missouri Association of Public Utilities
Date of Affiliation—June 18, 1920
Pres.—E. R. Locke, Missouri Utilities Co., Mexico, Missouri.
Sec.-Tr.—F. D. Beardslee, 315 N. 12th St., St. Louis, Mo.
Wiley F. Corl, Chmm. Affiliation Com., Missouri Utilities Co., Mexico, Mo.
Conv., 1923.

New England Association of Gas Engineers
Date of Affiliation—Feb. 19, 1919
Pres.—V. E. Bird, Connecticut Power Co., New London, Conn.
Sec.-Tr.—J. L. Tudbury, Salem Gas Light Co., Salem, Mass.
Conv., Boston, 1923.

Gas Sales Association of New England
Date of Affiliation—Oct. 1, 1919
Gov.—F. A. Woodhead, Arlington Gas Light Co., Arlington, Mass.
Sec.—M. Bernard Webber, 150 Congress St., Boston, Mass.
Annual Meeting, 1923.

New Jersey Gas Association
Date of Affiliation—April 25, 1919
Pres.—Jacob B. Jones, Bridgeton Gas Light Co., Bridgeton, N. J.
Sec.-Tr.—H. E. Mason, Consolidated Gas Co. of N. J., Long Branch, N. J.
Conv., 1923.

Pacific Coast Gas Association
Date of Affiliation—Sept. 18, 1919
Pres.—F. S. Wade, Southern Counties Gas Co., Los Angeles, Cal.
Sec.-Tr.—W. M. Henderson, 812 Howard St., San Francisco, Cal.
Conv., 1923.

Pennsylvania Gas Association
Date of Affiliation—April 10, 1919
Pres.—Luther Gaston Lebanon Gas & Fuel Co., Lebanon, Pa.
Sec.-Tr.—Geo. L. Cullen, Harrisburg Gas Co., Harrisburg, Pa.
Conv., 1923.

South Central Gas Association
Date of Affiliation—Oct. 15, 1919
Pres.—F. C. Armbruster, Southwestern Gas & Electric Co., Shreveport, La.
Sec.-Tr.—S. J. Ballinger, San Antonio Public Service Co., San Antonio, Texas.
Conv., 1923.

Southern Gas Association
Date of Affiliation—May 20, 1919
Pres.-P. H. Gadsden, The United Gas Improvement Co., Philadelphia, Pa.
Sec.-Tr.—G. H. Smith, City Gas Co., Norfolk, Va.
Conv., St. Petersburg, Fla., April 16-18, 1923.

Wisconsin Utilities Association
Pres.—J. P. Pulliam, Wisconsin Public Service Co., Milwaukee, Wis.
Exec.-Sec.—J. N. Cadby, 445 Washington Bldg., Madison, Wis.
Conv., Hotel Pfister, Milwaukee, Wis., March 22, 23, 1923.

ACCOUNTING SECTION

J. W. HEINS, Chairman — W. A. SAUER, Vice-Chairman

H. W. HARTMAN, Secretary

MANAGING COMMITTEE—1923

At Large

BRINE, F. A., Atlanta, Ga.
CASSELL, W. H., Baltimore, Md.
DAVIDSON, H. C., New York, N. Y.
DOERING, W. A., Boston, Mass.
FENNIMAN, J. R., New York, N. Y.
HALL, I. F., Boston, Mass.
HOFFMAN, F. C., St. Paul, Minn.
JEFFREY, Jos., Scranton, Pa.
LAWALL, H. J., Philadelphia, Pa.
LAWRENCE, JAMES, New York, N. Y.
LYNCH, B. W., Chicago, Ill.
MEYERS, W. J., New York, N. Y.
MURFIT, W. G., Newton, Pa.
PATTERSON, F. H., Rochester, N. Y.
POTTER, O. F., Newark, N. J.
RASTENBURG, F. G., Indianapolis, Ind.
REESE, J. G., Baltimore, Md.
SCHMIDT, JR., WM., Baltimore, Md.
SCOTT, J. M., Wilmington, Del.
SHORT, A. F., Providence, R. I.
TOSSELL, A. L., Chicago, Ill.
WINTERS, A. C., Chicago, Ill.

Representing Affiliated Societies

ARMSTRONG, J. J., Toronto, Can. (Canadian)
CLINTON, DEWITT, Worcester, Mass. (N. E. Gas Eng.)
DEAL, E. C., Springfield, Mo. (Missouri)
GOODNOW, A. C., Jacksonville, Fla. (Southern)
HAASE, EWALD, Milwaukee, Wis. (Wisconsin)
HODGES, E. W., San Francisco, Cal. (Pacific Coast)
JAMES, F. M., Aurora, Ill. (Illinois)
KURTZ, ADAM, Detroit, Mich. (Michigan)
MCCABE, J. B., Dallas, Texas (South Central)
PETTES, W. H., Newark, N. J. (New Jersey)
PHILLIPS, R. E., Lincoln, Neb. (Iowa)
PORTER, EDWARD, Philadelphia, Pa. (Pennsylvania)
SCOBELL, E. C., Rochester, N. Y. (Empire State G. & E.)
SHEARON, B. P., Hammond, Ind. (Indiana)
WILBUR, A. A., Brockton, Mass. (Gas Sales of N. E.)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Budget—F. H. PATTERSON, Rochester, N. Y.
Customers Accounting—W. A. DOERING, Boston, Mass.
Fixed Capital Records—H. J. LAWALL, Philadelphia, Pa.
Insurance—J. G. REESE, Baltimore, Md.
Nominating—EWALD HAASE, Milwaukee, Wis.
Relations with Customers—A. L. TOSSELL, Chicago, Ill.
State Representatives and Contributions to Monthly—JAMES LAWRENCE, New York, N. Y.
Uniform Classification of Accounts—W. J. MEYERS, New York, N. Y.

To Insure or Not to Insure?

A. J. METZEL,* United Gas Improvement Company, Philadelphia, Pa.

AND if so, what to insure? That is the question. During the three years which the writer has been in touch with the work of the Committee on Fire Insurance, this question has constantly been in evidence, either being directly asked, or at least being discernible under the surface as a question on which information is desired and needed. "What about insurance on holders?" "Do you insure retort houses?" "Should oil tanks be insured?" are some of the questions coming up. Another line of thought that has developed is this: "Our plant is fireproof, no insurance necessary," or "Buildings are brick and steel, cannot burn," etc. Evidence gathered from questionnaires sent to gas companies indicate that many companies have solved this problem by carrying no insurance whatever. While some of them have, no doubt, well considered plans of self-insurance, it appears that many others merely "take a chance," apparently on the theory that, as they have never had a fire or an explosion in the past, they will never have one in the future. Another group of companies, while they

* Member Insurance Committee, A. G. A.

carry some insurance, apparently do not insure all items of property, as a comparison between companies of relatively the same size indictes that one company will have considerably more insurance than the other, which seems to indicate that while one company insured its entire plant, the other carried insurance on only a portion of it.

The questionnaires sent out by the Insurance Committee asked for total premiums and total losses only, as this was all that was necessary to get at the important matter of rates on the gas plant classification, and it was not practicable to ask each company in detail just what it insured and what it did not insure. However, the returns indicate that many companies consider their property, or a portion of it, as "fire-proof" and place their insurance, or do not place it, accordingly.

Now if there ever was an ill-advised term, it is the term "fire-proof." In the words of the countryman at the circus, "there ain't no such animal." A Committee of the National Fire Prevention Association, which is probably our highest authority on fire prevention matters, has recommended that the term be discontinued, and the term "fire-resistive" be substituted. In other words, while certain materials will resist fire better than other material, if a fire is of sufficient intensity it will damage, and damage severely, any known substance. As the result of hot fires steel girders warp and twist, concrete cracks, and stone and marble chips, so that while not totally destroyed, they are rendered unavailable for the use for which they were intended.

After seeing a report of fires in fire hose caused by the water running through, it is possible to believe that there can be a fire anywhere. And this is not a joke by any means. Serious damage has been done to fire hose caused by the friction of water running through at high pressure, which set up an action between the rubber lining and the outer casing somewhat similar to spontaneous combustion. Newspaper articles not long ago gave an account of a fire in a strictly so-called fire-proof office building in the heart of Chicago, which did a vast amount of damage. While the building itself was not destroyed, the contents were, involving the loss of valuable records that no amount of insurance can replace. And yet many people seem to think there is little danger of fire in this type of structure.

Getting back to our own business, the gas holder is often considered impregnable, with its all steel construction, and generally isolated position, and it is true that damage from fire or explosion is very rare, but, nevertheless, trade papers not long ago noted a fire and explosion of a holder in a Middle Western city which did a vast amount of damage. Another item which is quite generally considered immune from fire is the retort house, yet at a particular plant where all structures were insured except the retort house, which was not insured because it was "fire-proof," the only fire they had over a long period of years damaged the retort house, and the tile roof at that.

It may be argued that while a hot fire will damage a building of any construction, there is nothing about a gas plant to originate the intense heat in the first place, unless, indeed, a conflagration should strike the town or city in which the plant is located, and this is to some extent true. However, there is another element in our business that makes the risk in the so-called fire-proof building

just as great as in any other building, and that is the explosion hazard. The explosion of gas is now covered by the ordinary fire insurance policy in practically all underwriting jurisdictions in the country, provided the proper clause is attached to the policies. The Insurance Committee has endeavored to make this point clear wherever possible, but there still appears evidence that it is not understood.

While the explosion of gas has never reached the point where it presents a hazard that the insurance companies have to seriously worry about, nevertheless, it is probably the greatest hazard of the business, and an ever present one, and it is no respecter of fire-proof buildings. The largest loss to a gas plant of which the Committee has a record, amounting to approximately $50,000, was an explosion loss which originated in an exhauster house. The building was of good brick construction, but the construction had nothing to do with the amount of the loss; in fact, the loss would probably have been less if the construction had not been so good. In a report on a serious explosion at a gas plant some time ago, one of the State Inspection Bureaus states that the damage was made very much greater because the building where the explosion originated had a monolithic roof. The roof blew off and the heavy pieces fell back and greatly damaged the apparatus. This explosion, by the way, is supposed to have originated from a spark caused by friction of a belt attached to an electric motor, which ignited escaping gas from a scrubber.

Just last week an explosion occurred in a governor house, which practically wrecked the building. An examination of a fire record covering some two hundred fires at gas plants during the past thirty years, failed to show that an explosion had ever occurred in a governor house before, and it would have been very easy to formulate the theory that a loss collectible under the fire insurance policy could not occur, but this particular governor house seemingly had no regard for the good example set by its predecessors.

And so the actual record of fires and explosions goes on, and shows the utter futility of trying to figure out what to insure and what not to insure. Insurance has been originated to relieve the property owner of this uncertainty. It enables him to take up on his books each month a definitely determinable sum, and to get all the costs of his business on his books, instead of having a potential liability which he has no possible means of measuring. And the cost of insurance is a perfectly legitimate one, and one which should be included in some way in the total expenses of operation as a basis of determining the proper rate to be charged consumers of gas.

It is not the purpose of this article to criticise the practice of self-insurance. A properly conceived fund, with adequate resources, with good spread of risk and a full realization of the hazards involved, is probably the ideal way of providing for the fire and explosion hazard. It is desired to point out, however, that those companies who carry no insurance, or who insure only a part of their property, merely on the theory that nothing can happen to it, are not putting on their books the true cost of doing business.

Apropos of the matter of self-insurance, it has been very aptly said that there are two conditions under which it is not desirable; one is where the risk is great, and the other is where

the cost is small. Now the record shows that while the loss record of gas plants is very good, it is not perfect by any means. Records of the insurance committee show fires amounting to $10,000, $12,000, $18,000, $30,000 and up to $50,000. (These figures are for a single company and represent the total losses for a year, not necessarily the amount of a single fire, although the $50,000 loss was the result of a single explosion). As to the cost of insurance on gas plants, it is generally supposed to be high, and it is. One good member of this Association wrote that he carried no insurance and that his plant could burn down every ten years completely and he would still be ahead of the game. This is indeed a sad case, but we believe unusual. Actually, the loss ratio has been running slightly over 20% of premiums. However, rates have been recently reduced. We were promised a reduction of approximately 25%, and of the few records yet available, showing the progress of re-ratings, the results are running surprisingly close to that figure. Furthermore, the new schedule shows a more intelligent appreciation of the hazards of such items as oil tanks, retorts, purifiers, scrubbers, condensers, coal and coke handling apparatus, etc., and rates on these items have been reduced considerably more than 25%. In this connection it might be well to note that while the minds of the insurance authorities do not run in exactly the same channels as our own, they are going in the same general direction, and the structures which we considered particularly free from hazard are also so regarded by the insurance companies. Thus, if the insurance policy shows the rate to be, say $1.00, it will probably be found that it is because some hazardous item, such as garage or frame coal shed, is rated at $1.50 or $2.00, thus bringing up the average rate, but that some other item, such as a holder, oil tank or purifier may be added to the schedule, not at the average rate of $1.00 but at a rate of from 15 cents to 50 cents.

In addition to all this, there is a possibility of still further reduction if the loss ratio justifies it, although it would be idle to speculate at this time, while the first reduction is yet in the process of being put into effect, what may be expected in the future, or when it may be expected. Newspapers the other day chronicled the fact that a magnetic survey of the earth had just been completed, whatever that may mean, and that the work was of considerable value to science, but that it took sixteen years to complete. The working up of sufficient data to justify any radical changes in insurance rates is a slow process at best, but with the help of member companies the matter will be followed up so that the fullest advantage may be taken of any favorable conditions which may be developed. The gap between premiums paid and losses collected will always seem great, for the expenses of the insurance companies are heavy, many think too heavy for the service they perform, but it must be remembered that in addition to providing compensation for actual losses sustained, the insurance companies provide a comfortable feeling in the minds of stock and bond holders at all times, and enables the assured to put his cost keeping on a sound basis, and, figuring out the cost of full protection against fire and explosion risks per M. cu. ft. of gas, it is at the most but a small part of operating expenses.

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Representatives of the Public Utilities Advertising Association on National Advertising Commission

Join Your Advertising Association

THE Public Utilities Advertising Association is now a real, live, going organization. Each mail brings in an increasing number of applications for membership from gas, electric light and power, street railway and telephone advertising men and their companies.

The Pacific Coast is taking a great interest in the new project, due to the fact that companies and individuals

there know the power that the Associated Advertising Clubs of the World wields as a national organization and the great good that will result to the entire utility industry by affiliating itself with the "Truth in Advertising" movement.

An effort has been made by the membership committee to canvass the whole utility field for members. About 300 invitations have been issued to men in the gas industry. In view of the difficulty encountered in securing a complete list of gas advertising men and the desire of the new organization to keep down expenses to the minimum, invitations to join the Association have been sent to a representative list but no broadcasting has been done as yet. This explanation is made because hundreds of active advertising men in the gas industry have not received invitations to join. However, they are warmly welcomed into the Association and any interested gas man whose eye catches this article should communicate at once with A. G. A. headquarters without waiting for a personal invitation.

Annual dues are $5.00, and the only formality in joining is to fill out a card subscribing to the requirements, by-laws and standards of practice of the Association. Checks in payment of dues should be sent to George F. Oxley, N. E. L. A., 29 West 39th Street, New York, N. Y.

W. P. Strandborg, of Portland, Oregon, who is a vice-president of the Associated Advertising Clubs of the World, is president of the new association and chairman of its program committee. He informs us that at the forthcoming advertising convention at Atlantic City the week of June 3 to 8, the public utility men will hold three sessions, the major theme of the meetings being "Telling Our Story to the Public." Nine top-notch speakers will be chosen, three for each session.

Of interest in connection with this first gathering of utility advertising men will be an exhibition of newspaper, magazine and direct-by-mail advertising used by utility companies. E. J. Cooney, a member of the Managing Committee of the Publicity and Advertising Section, will be in charge of this display.

Other articles describing the aims and organization of the Public Utilities Advertising Association may be found in the following issues of this magazine: September, 1922, pages 541 and 542; December, 1922, pages 739 and 740.

Oklahoma Utilities Association and Southwestern Geographic Division of N. E. L. A.

The Oklahoma Utilities Association's annual convention is to be held at Oklahoma City on March 12, 13, and 14. They will meet in joint session, on March 14th, with the Southwestern Geographic Division of the National Electric Light Association, which is holding its annual convention at the same place on March 14, 15 and 16. A large attendance is expected and interesting programs have been laid out.

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CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Exhibition—F. A. LEMKE, Kalamazoo, Mich.
Nominating—J. S. DEHART, JR., Newark, N. J.
Division of Accessories Manufacturers—EARL W. ROBERTS, Detroit, Mich.
Division of Apparatus & Works Manufacturers—D. J. COLLINS, Philadelphia, Pa.
Division of Gas Range Manufacturers—W. H. TAPPAN, Mansfield, Ohio.
Division of Heating Appliance Manufacturers—E. P. BAILEY, JR., Cleveland, Ohio.
Division of Industrial Appliance Manufacturers—H. R. MAXON, Muncie, Ind.
Division of Lighting Appliance Manufacturers—TOWNSEND STITES, Gloucester, N. J.
Division of Meter Manufacturers—DONALD MCDONALD, New York, N. Y.
Division of Office Labor Saving Devices—E. A. NORMAN, New York, N. Y.
Division of Water Heater Manufacturers—O. P. SIMLER, Lorain, Ohio.
Division of Supply Maunfacturers—J. J. GREENE, New York, N. Y.

The New Classified Directory—Manufacturers of Gas Equipment

Beginning on page 82 of this issue, there is printed the revised classified directory of manufacturers of gas equipment.

This list was compiled from information available at Headquarters and attempts to be as complete as possible. In order that the directory should not be too cumbersome for publication, we have made use of abbreviations in the company names and for use in conjunction with the directory have printed a list of manufacturer company members with full name and address.

Appreciating its value to purchasing agents and others, and realizing that we may not have entirely covered the list of products of each manufacturer member, we would be glad to have any additional information for publication in the directory to increase its value.

We would also appreciate being advised of those cases where we may have included the name of a company under a caption representing a product not manufactured by such company. Such corrections will improve the accuracy of the directory.

Classified Directory—Manufacturers of Gas Equipment

Index of Manufacturer Company Members

A-B Stove Co. ..... Battle Creek, Mich.
Acme Brass Works ..... 8211 Collins Ave., Detroit, Mich.
Addressograph Co. ..... 901 W. Van Buren St., Chicago, Ill.
Ajax Brass & Iron Co. ..... 398 Harmon St., Brooklyn, N. Y.
Alpha-Lux Co. Inc. ..... 192 Front St., New York, N. Y.
Alphons Custodis Chimney Construction Co. ..... 1449 Marquette Bldg., Chicago, Ill.
American Gas Appliance Co. ..... 118 Sanford St., Brooklyn, N. Y.
American Gas Construction Co. ..... Newton, Ia.
American Gas Furnace Co. ..... Elizabeth, N. J.
American Ironing Machine Co. ..... 844 W. Adams St., Chicago, Ill.
American Lava Corp. ..... 1411 William St., Chattanooga, Tenn.
American Meter Co. ..... 105 W. 40th St., New York, N. Y.
American Radiator Co. ..... 816 S. Michigan Ave., Chicago, Ill.
American Range & Foundry Co. ..... 509 Marquette Ave., Minneapolis, Minn.
Armstrong Cork & Insulation Co. ..... 24th St. & Allegheny River, Pittsburgh, Pa.
Atlantic Tubing Co. ..... 1756 Cranston St., Providence, R. I.

Bacharach Industrial Instrument Co. ..... Box 39 Homewood Sta., Pittsburgh, Pa.
Bailey Meter Co. ..... 2015 E. 46th St., Cleveland, O.
The Baltimore Enamel & Novelty Co. ..... Baltimore, Md.
The Baltimore Gas Appliance & Mfg. Co. ..... Bayard & Hamburg Sts., Baltimore, Md.
The Barrett Co. ..... 40 Rector St., New York, N. Y.
Bartlett & Co. Inc. ..... 1938 Market St., Philadelphia, Pa.
The Bartlett Hayward Co. ..... Baltimore, Md.
Bastian-Morley Co. ..... La Porte, Ind.
R. H. Beaumont Co. ..... 315 Arch St., Philadelphia, Pa.
Belgian American Coke Ovens Corp. ..... Postal Box 1420, St. Louis, Mo.
Benson Manufacturing Co. ..... 115 N. Desplaines St., Chicago, Ill.
The G. S. Blodgett Co. ..... 190 Bank St., Burlington, Vt.
The Bristol Co. ..... Waterbury, Conn.
Brunner Stove Co. ..... 438 W. 164th St., New York, N. Y.
The Bryant Heater & Mfg. Co. ..... 952 E. 72nd St., Cleveland, O.
Burroughs Adding Machine Co. ..... Burroughs & Second Aves., Detroit, Mich.
By-Products Coke Corp. ..... 332 S. Michigan Ave., Chicago, Ill.

The Canton Clothes Dryer Co. ..... Canton, O.
Century Stove & Mfg. Co. ..... Johnstown, Pa.
Chambers Mfg. Co. ..... Shelbyville, Ind.
The Chaplin-Fulton Mfg. Co. ..... 36 Penn Ave., Pittsburgh, Pa.
Chicago Vitreous Enamel Product Co. ..... Cicero, Ill.
Geo. M. Clark & Co. Div. ..... 179 N. Michigan Ave., Chicago, Ill.
Claus Automatic Gas Cock Co. ..... 1630 Booth St., Milwaukee, Wis.
The Cleveland Co-Operative Stove Co. ..... 2323 E. 67th St., Cleveland, O.
Cleveland Gas Meter Co. ..... 2180 E. 65th St., Cleveland, O.
The Cleveland Heater Co. ..... 1900 W. 112th St., Cleveland, O.
James B. Clow & Sons ..... 534 S. Franklin St., Chicago, Ill.
Commercial Gas Appliance Co. ..... 1714 Aliceanna St., Baltimore, Md.
Comstock Castle Stove Co. ..... Front & Washington Sts., Quincy, Ill.
Connelly Iron Sponge & Governor Co. ..... 227 Fulton St., New York, N. Y.
Connersville Blower Co. ..... Connersville, Ind.
The Crandall Pettee Co. ..... 150 Franklin St., New York, N. Y.
Crane Company ..... 836 S. Michigan Ave., Chicago, Ill
Wm. M. Crane Co. ..... 16 W. 32nd St., New York, N. Y.
Cribben & Sexton Co. ..... 800 N. Sacramento Blvd., Chicago, Ill.
Cruse-Kemper Co. ..... Ambler, Pa.
The Cutler-Hammer Mfg. Co. ..... 12th & St. Paul Aves., Milwaukee, Wis.

Dangler Stove Co. Div. ..... 5017 Perkins Ave., Cleveland, O.
M. T. Davidson Co. ..... 154 Nassau St., New York, N. Y.
Davis & Farnum Mfg. Co. ..... Waltham, Mass.
Detroit Brass & Malleable Works ..... 1177 Holden Ave., Detroit, Mich.

Detroit Stove Works ..... 6900 E. Jefferson Ave., Detroit, Mich.
Detroit Washing Machine Corp. ..... 511 Leib St., Detroit, Mich.
B. F. Drakenfeld & Co. Inc. ..... 50 Murray St., New York, N. Y.
S. R. Dresser Mfg. Co. ..... Bradford, Pa.
Duparquet, Huot & Moneuse Co. ..... 110 W. 22nd St., New York, N. Y.

Eastman Mfg. Co. ..... 1002 N. 11th St., Manitowoc, Wis.
Elgin Stove & Oven Co. ..... 14 Chicago St., Elgin, Ill.
Elliott-Fisher Co. ..... 342 Madison Ave., New York, N. Y.
Enamel Products Co. ..... Eddy Rd. & Taft Ave., Cleveland, O.
Equitable Meter Co. ..... 422 First Ave., Pittsburgh, Pa.
Eriez Stove & Mfg. Co. ..... W. 18th St., Erie, Pa.
The Estate Stove Co. ..... Hamilton, O.

Foundation Oven Corp. ..... 120 Liberty St., New York, N. Y.
The Foxboro Co. Inc. ..... Foxboro, Mass.
French Battery & Carbon Co. ..... Madison, Wis.
The Fuller-Warren Co. ..... 930-32nd St., Milwaukee, Wis.

Gallaher Boiler Co. ..... Laclede Gas Bldg., St. Louis, Mo.
Gas Engineering Co. ..... Trenton, N. J.
The Gas Machinery Co. ..... 1900 Euclid Ave., Cleveland, O.
Gas Purifying Materials Co. ..... Foot of Halsey St., Long Island City, N. Y.
Gas Utilities Corp. ..... 1200 Locust St., Philadelphia, Pa.
J. H. Gautier & Co. ..... Greene & Essex Sts., Jersey City, N. J.
Gehnrich Indirect Heat Oven Co. Inc. ..... Honeywell St. & Skillman Ave., L. I. City, N. Y.
General Gas Appliance Co. ..... 103 Park Ave., New York, N. Y.
General Gas Light Co. ..... Kalamazoo, Mich.—44 West Broadway, New York, N. Y.
Geyser Sales Co. ..... 139 N. Clark St., Chicago, Ill.
The Globe Stove & Range Co. ..... Kokomo, Ind.
Go-Ro Incorporated ..... Carrollton & Tulane Aves., New Orleans, La.
The J. H. Grayson Mfg. Co. ..... Athens, O.
John J. Griffin & Co. ..... 1513 Race St., Philadelphia, Pa.
Grinnell Co. Inc. ..... 260 W. Exchange St., Providence, R. I.
Guardian Gas Appliance Co. ..... 3409 Superior Ave., Cleveland, O.

Hale Manufacturing Co. ..... 115 N. Desplaines St., Chicago, Ill.
Harbison-Walker Refractories Co. ..... 1800 Farmers Bank Bldg., Pittsburgh, Pa.
Harlan Co-Operative Coal Co. ..... Fayette Bank Bldg., Lexington, Ky.
Harrisburg Foundry & Machine Works ..... Harrisburg, Pa.
Hays Manufacturing Co. ..... W. 12th St., Erie, Pa.
Helme & McIlhenny ..... 17th & Clearfield Sts., Philadelphia, Pa.
The Hoffman Heater Co. ..... Washington Ave., Lorain, O.
Home Stove & Foundry Co. ..... 2600 W. 18th Place, Chicago, Ill.
Charles A. Hones, Inc. ..... Baldwin, Long Island, N. Y.
Howard Stove Co. ..... 11th St. & 11th Ave., Beaver Falls, Pa.
Hugo Manufacturing Co. ..... West Duluth, Minn.
Humphrey Co. ..... Kalamazoo, Mich.

Illinois Specialty Mfg. Co. ..... Bloomington, Ill.
The Improved Appliance Co. ..... 413 Kent Ave., Brooklyn, N. Y.
The Improved Equipment Co. ..... 24 State St., New York, N. Y.
Iron Hydroxide Co. ..... Paschall Sta., Philadelphia, Pa.
Iron Oxide Products, Inc. ..... 1301-9 S. 55th Court, Cicero, Ill.
Isbell-Porter Co. ..... 46 Bridge St., Newark, N. J.

Johns-Manville, Inc. ..... Madison Ave. & 41st St., New York. N. Y.
Johnson Gas Appliance Co. ..... 530 E Ave., W., Cedar Rapids, Ia.

Kalamazoo Loose Leaf Binder Co. ..... Kalamazoo, Mich.
Wm. Kane Mfg. Co. ..... 1903-15 E. Hagert St., Philadelphia, Pa.
The C. M. Kemp Mfg. Co. ..... 405 E. Oliver St., Baltimore, Md.
Kennedy-Toombs Inc. ..... 126 Eleventh Ave., New York, N. Y.
Kidde & Co. ..... 103 Park Ave., New York, N. Y.
Kitson Co. ..... 2815 Oakford St., Philadelphia, Pa.
The Kompak Co. ..... New Brunswick, N. J.
The Koppers Co. ..... Union Arcade, Pittsburgh, Pa.

Lambert Meter Co. Inc. ..... Bush Terminal, Bldg. No. 4, Brooklyn, N. Y.

The Lattimer Stevens Co. ..... 72 Yale Ave., Columbus, O.
Lawson Mfg. Co. ..... 300 Lexington Ave., Pittsburgh, Pa.
Lindsay Light Co. ..... 161 E. Grand Ave., Chicago, Ill.
Logan County Coal Corp. ..... 2015 Union Central Bldg., Cincinnati, O.
The Lovekin Water Heater Co. ..... 39 Laurel St., Philadelphia, Pa.
The Ludlow Valve Mfg. Co. ..... Foot of Adams St., Troy, N. Y.
Lungmotor Corporation ..... 180 N. Market St., Chicago, Ill.
Eph Lyon Co. ..... Trust Bldg., Franklin, Pa.

D. McDonald & Co. ..... 991 Broadway, Albany, N. Y.
The McRae & Roberts Co. ..... 100 S. Campbell Ave., Detroit, Mich.
Magee Furnace Co. ..... 38 Union St., Boston, Mass.
Malleable Iron Range Co. ..... Beaver Dam, Wis.
Maryland Meter Works ..... Holliday & Saratoga Sts., Baltimore, Md.
Maxon Furnace & Engineering Co. ..... Muncie, Ind.
Meek Oven Mfg. Co. ..... Westport, Conn.
Metcalfe-Shaw Corp. ..... 811 Railroad Ave., S., Seattle, Wash.
Metric Metal Works ..... 10th & Payne Aves., Erie, Pa.
The Meyercord Co. ..... Chamber of Commerce Bldg., Chicago, Ill.
Michigan Ammonia Works ..... Foot of Meldrum Ave., Detroit, Mich.
The Michigan Stove Co. ..... 3306 E. Jefferson Ave., Detroit, Mich.
Milwaukee Gas Specialty Co. ..... 2015 Clybourn St., Milwaukee, Wis.
Mine Safety Appliances Co. ..... Chamber of Commerce Bldg., Pittsburgh, Pa.
Missouri Fire Brick Co. ..... Security Bldg., St. Louis, Mo.
Moffats Ltd. ..... Weston, Ont., Can.
The Monarch Engineering & Mfg. Co. ..... 1206 American Bldg., Baltimore, Md.
H. Mueller Manufacturing Co. ..... Decatur, Ill.

National Machine Works ..... 1559 Sheffield Ave., Chicago, Ill.
National Stove Co. Div. ..... Lorain, O.
National Tube Co. ..... Frick Bldg., Pittsburgh, Pa.
New Process Stove Co. Div ..... 4301 Perkins Ave., Cleveland, O.
The 1900 Washer Co. ..... Binghamton, N. Y.

The Ofeldt Gas Fired Boiler Co. ..... Foot of Main St., Nyack, N. Y.
Ohio State Stove Co. ..... Columbus, O.

Parker-Russell Mining & Mfg. Co. ..... Laclede Gas Bldg., St. Louis, Mo.
The Peerless Mfg. Co. ..... 15th & Ormsby Row, Louisville, Ky.
Peninsular Brass Works ..... W. Warren & Walton Aves., Detroit, Mich.
The Peninsular Stove Co. ..... Fort St., W., Detroit, Mich.
Philadelphia Stove Co. ..... 1631 N. 5th St., Philadelphia, Pa.
Phillips & Clark Stove Co. Inc. ..... Geneva, N. Y.
Phillips, Lang & Co. ..... 538 S. Dearborn St., Chicago, Ill.
Pittsburgh Meter Co. ..... Braddock & Cable Aves., East Pittsburgh, Pa.
Pittsburg Water Heater Co. ..... Box 1109, Pittsburgh, Pa.
Porcelain Enamel & Mfg. Co. ..... 8th & O'Donnell Sts., Baltimore, Md.
Precision Instrument Co. ..... 21 Halsey St., Newark, N. J.
Protecto Safety Appliance Co. ..... 50 Columbia St., Newark, N. J.

Quick Meal Stove Co. Div. ..... 825 Chouteau Ave., St. Louis, Mo.
Quigley Furnace Specialties Co. ..... 26 Cortlandt St., New York, N. Y.

Rathbone, Sard & Co. ..... Aurora, Ill.
Reliable Stove Co. Div. ..... 1787 E. 40th St., Cleveland, O.
Remington Typewriter Co. Inc. ..... 374 Broadway, New York, N. Y.
Republic Flow Meters Co. ..... 2240 Diversey Blvd., Chicago, Ill.
Reynolds Gas Regulator Co. ..... Anderson, Ind.
Reznor Manufacturing Co. ..... Mercer, Pa.
Craig Ridgway & Son Co. ..... Coatesville, Pa.
Riter Conley Co. ..... Box 939, Pittsburgh, Pa.
The Roberts Brass Mfg. Co. ..... 5435 Fort St., W., Detroit, Mich.
Roberts & Mander Stove Co. ..... 11th & Washington Ave., Philadelphia, Pa.
Robertshaw Thermostat Co. ..... Youngwood, Pa.
Geo. D. Roper Corp. ..... Rockford, Ill.
Rotary Meter Co. ..... 52 Vanderbilt Ave., New York, N. Y.
Russell Engineering Company ..... 1624 Railway Exchange Bldg., St. Louis, Mo.
Ruud Manufacturing Co. ..... 29th & Smallman Sts., Pittsburgh, Pa.
B. Ryan Co. ..... 366-372 W. 15th St., New York, N. Y.

Safety Gas Lighter Co. ..... Lynn, Mass.
Safety Gas Main Stopper Co. ..... 523 Atlantic Ave., Brooklyn, N. Y.
The Sands Manufacturing Co. ..... 5407 Sweeney Ave., Cleveland, O.
The Schaeffer & Budenberg Mfg. Co. ..... 338 Berry St., Brooklyn, N. Y.
G. F. Schmidt Co. ..... 1338 Carmen Ave., Chicago, Ill.
Scott Gas Appliance Co. Inc. ..... Suite 412 Bond Building, Washington, D. C.
Security Stove & Manufacturing Co. ..... 17th & Oakland Ave., Kansas City, Mo.
Selas Co. ..... 940 N. Front St., Philadelphia, Pa.
Semet-Solvay Co. ..... Syracuse, N. Y.
The S. B. Sexton Stove & Mfg. Co. ..... 500 Block W. Conway St., Baltimore, Md.
The Sharples Specialty Co. ..... 501 Fifth Ave., New York, N. Y.
Sheet Metal Specialty Co. ..... 3rd & Liberty Aves., Pittsburgh, Pa.
J. M. Sherwood Co. ..... 44 Murray St., New York, N. Y.
J. B. Slattery & Bro. Inc. ..... 119 Sanford St, Brooklyn, N. Y.
S O S Welding Corp. ..... 235 Sixth St., Brooklyn, N. Y.
The Sprague Meter Co. ..... 35 South Ave., Bridgeport, Conn.
The Stacey Bros. Gas Construction Co. ..... 5535 Carthage Pike, Cincinnati, O.
The Stacey Manufacturing Co. ..... Elmwood Place, Cincinnati, O.
Standard Brass Works ..... 2931 Wight St., Detroit, Mich.
Standard Chemical & Supply Co. ..... 172 Second St., Cambridge A, Mass.
Steere Engineering Co. ..... General Motors Bldg., Detroit, Mich.
E. E. Steiner & Co. Inc. ..... 2-16 Avenue C, Newark, N. J.
Stephens-Adamson Mfg. Co. ..... Aurora, Ill.
Storrs Mica Co. ..... 117 Front St., Owego, N. Y.
Strait & Richards Inc. ..... Fabyan Pl. & Selvage St., Newark, N. J.
Strause Gas Iron Co. ..... 1425 Vine St., Philadelphia, Pa.
B. F. Sturtevant Co. ..... Damon St., Boston, Mass.
Superbo Manufacturing Co. ..... 1654 Long Beach Ave., Los Angeles, Calif.
Superior Laboratories ..... 28-30 Ionia St., S. W., Grand Rapids, Mich.
Superior Meter Co. ..... Bush Terminal Bldg. No. 2, Brooklyn, N. Y.
The Surface Combustion Co. ..... 366 Gerard Ave.,Bronx, N. Y.

Tallman, Robbins & Co. ..... 314 W. Superior St., Chicago, Ill.
The Tappan Stove Co. ..... Mansfield, O.
The Trenkamp Stove & Mfg. Co. ..... 9806 Quincy St., Cleveland, O.
Nathaniel Tufts Meter Works ..... 455 Commercial St., Boston, Mass.
Union Steel Products Co. Ltd. ..... Albion, Mich.
Union Stove Works ..... 70 Beekman St., New York, N. Y.
The U. G. I. Contracting Co. ..... Broad & Arch Sts., Philadelphia, Pa.
United Lead Co. ..... 111 Broadway, New York, N. Y.
United States Refractories Co. ..... Mount Union, Pa.
United Utilities & Engineering Corp. ..... Lansdale, Pa.

Van Zandt Gas Appliance Co. ..... 4050 Olive St., St. Louis, Mo.
Vesta Gas Range & Mfg. Co. ..... Chattanooga, Tenn.

The Wales Co. ..... Kalamazoo, Mich.
Walker & Pratt Mfg. Co. ..... 31 Union St., Boston, Mass.
The Wehrle Co. ..... 550 Wehrle Ave., Newark, O.
Weir Stove Co. ..... Taunton, Mass.
Welsbach Co. ..... Gloucester, N. J.
West Gas Improvement Co. of America ..... 150 Nassau St., New York, N. Y.
The Western Gas Construction Co. ..... Fort Wayne, Ind.
Wheeling Corrugating Co. ..... Wheeling, W. Va.
Wilbraham-Green Blower Co. ..... Pottstown, Pa.
H. A. Wilson Co. ..... 97 Chestnut St., Newark, N. J.
Wincroft Stove Works ..... Middletown, Pa.
The A. H. Wolff Gas Radiator Co. ..... 4 Great Jones St., New York, N. Y.

Young Brothers Co. ..... 6500 Mack Ave., Detroit, Mich.

* * *

Classified Directory

Note—For complete address of firms, see index of manufacturer company members.

AGITATORS
- Bartlett Hayward Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

Benzol
- Belgian American Coke Ovens Corp.
- Koppers Co.
- Western Gas Construction Co.

AMMONIA

Liquor Concentrators
- Bartlett Hayward Co.
- Belgian American Coke Ovens Corp.
- Gas Machinery Co.
- Isbell-Porter Co.
- Koppers Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

Recovery Apparatus
- Bartlett Hayward Co.
- Belgian American Coke Ovens Corp.
- Gas Machinery Co.
- Isbell-Porter Co.
- Koppers Co.
- Michigan Ammonia Works
- Stacey Mfg. Co.
- Western Gas Construction Co.

Ammonia & Sulphur Apparatus
- Belgian American Coke Ovens Corp.
- Gas Machinery Co.
- Isbell-Porter Co.
- Western Gas Construction Co.

AMMONIUM SULPHATE PRODUCTION APPARATUS (without Sulphuric Acid)
- Bartlett Hayward Co.
- Belgian American Coke Ovens Corp.
- Gas Machinery Co.
- Koppers Co.
- Western Gas Construction Co.

ANALYZERS

Flue Gas
- Bacharach Industrial Instrument Co.
- Foxboro Co., Inc.
- Precision Instrument Co.
- Schaeffer & Budenberg Mfg. Co.

Gas
- Foxboro Co., Inc.
- Precision Instrument Co.
- Schaeffer & Budenberg Mfg. Co.

ANNEALERS (Bar, Blank, Strip)
- American Gas Furnace Co.

ANTI-FLUCTUATORS
- American Meter Co. Inc.
- U. G. I. Contracting Co.

APPARATUS, EXPERIMENTAL GAS
- American Gas Furnace Co.
- American Meter Co. Inc.

APPRAISALS & VALUATIONS
- Davis & Farnum Mfg. Co.
- U. G. I. Contracting Co.

AQUA AMMONIA APPARATUS
- Bartlett Hayward Co.
- Gas Machinery Co.
- Isbell-Porter Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

ASBESTOS & MAGNESIA PRODUCTS
- Johns-Manville Inc.

BAGS, GAS MAIN
- American Meter Co. Inc.
- Connelly Iron Sponge & Governor Co.

BAROMETERS
- American Meter Co. Inc.
- Connelly Iron Sponge & Governor Co.
- Precision Instrument Co.
- Schaeffer & Budenberg Mfg. Co.

BENCHES
- American Gas Construction Co.
- Gas Machinery Co.
- Gautier & Co., J. H.
- Improved Equipment Co.
- Isbell-Porter Co.
- Missouri Fire Brick Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Stacey Mfg. Co.
- U. G. I. Contracting Co.

BENCH IRON WORK
- American Gas Construction Co.
- Banner Iron Works
- Bartlett Hayward Co.
- Davis & Farnum Mfg. Co.
- Gas Machinery Co.
- Improved Equipment Co.
- Isbell-Porter Co.
- Missouri Fire Brick Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Stacey Mfg. Co.
- Western Gas Construction Co.

BENZOL RECOVERY APPARATUS
- Bartlett Hayward Co.
- Koppers Co.
- Western Gas Construction Co.

BINS, STORAGE (Ash, Coal, Coke)
- Bartlett Hayward Co.
- Beaumont Co., R. H.
- Cruse-Kemper Co.
- Davis & Farnum Mfg. Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Stacey Bros. Gas Construction Co.
- Stacey Mfg. Co.
- U. G. I. Contracting Co.
- Western Gas Construction Co.
- Young Brothers Co.

BLAST GATES
- American Gas Construction Co.
- Monarch Engineering & Mfg. Co.
- Steere Engineering Co.
- Sturtevant Co. Inc., B. F.
- U. G. I. Contracting Co.
- Western Gas Construction Co.

BLOCKS & TILES, FIRE CLAY
- American Gas Construction Co.
- Gas Machinery Co.
- Gautier & Co., J. H.
- Improved Equipment Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Strait & Richards Inc.
- U. G. I. Contracting Co.

BLOWERS & BOOSTERS
- American Gas Construction Co.
- American Gas Furnace Co.
- Connelly Iron Sponge & Governor Co.
- Connersville Blower Co.
- Gas Engineering Co.
- Gas Machinery Co.
- Improved Appliance Co.
- Kemp Mfg. Co., C. M.
- Maxon Furnace & Engineering Co.
- Monarch Engineering & Mfg. Co.
- Parker-Russell Mining & Mfg. Co.
- Russell Engineering Co.
- Selas Co.
- Sturtevant Co., B. F.
- Surface Combustion Co.
- U. G. I. Contracting Co.
- Wales Co.
- Western Gas Construction Co.
- Wilbraham-Green Blower Co.

BLOW-PIPES
American Gas Furnace Co.
BOILERS, GAS-FIRED
Industrial
Bastian-Morley Co.
Blodgett Co., G. S.
Bryant Heater & Mfg. Co.
Crane Co., Wm. M.
Gallaher Boiler Co.
General Gas Appliance Co.
Improved Appliance Co.
Kane Mfg. Co. Inc., Wm.
Kidde & Co.
National Machine Works
Ofeldt Gas Fired Boiler Co. Inc.
Wales Co.
United Utilities & Engineering Corp.
House Heating
American Radiator Co.
Bartlett & Co. Inc.
Bastian-Morley Co.
Bryant Heater & Mfg. Co.
Gallaher Boiler Co.
Gas Utilities Corp.
General Gas Appliance Co.
Kane Mfg. Co. Inc., Wm.
Kidde & Co.
National Machine Works
United Utilities & Engineering Corp.
Laundry
Hugo Mfg. Co.
BOILERS, WASTE HEAT
American Gas Construction Co.
Bartlett Hayward Co.
Gas Engineering Co.
Gas Machinery Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
BOXES
Curb, Roadway
Hays Mfg. Co.
Purifier
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
U. G. I. Co.
Western Gas Construction Co.
Service
Davis & Farnum Mfg. Co.
Grinnell Co. Inc.
Hays Mfg. Co.
Mueller Mfg. Co., H.
BRAKE & FRICTION MATERIALS
Johns-Manville Inc.
BRAZING TABLES
American Gas Furnace Co.
Improved Appliance Co.
BREECHING, BOILER & STACK
Bartlett Hayward Co.
Cruse-Kemper Co.
Riter-Conley Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
Young Brothers Co.
BRICK, FIREBRICK
American Gas Construction Co.
Gas Machinery Co.
Gautier & Co., J. H.
Harbison-Walker Refractories Co.
Improved Equipment Co.
Missouri Fire Brick Co.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Russell Engineering Co.
U. G. I. Contracting Co.
United States Refractories Corp.
Western Gas Construction Co.
BROILERS, HOTEL
Clark & Co., Geo. M.
Crane Co., Wm. M.
Detroit Stove Works
Fuller-Warren Co.
General Gas Appliance Co.
Michigan Stove Co.
Quick Meal Stove Co. Div.
Rathbone, Sard & Co.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Union Steel Products Co. Ltd.
BUILDINGS, STEEL
Bartlett Hayward Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
BUNKERS, STEEL & CONCRETE
Bartlett Hayward Co.
Beaumont Co., R. H.
Cruse-Kemper Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
BURNERS
Industrial
American Gas Appliance Co.
American Gas Furnace Co.
Baltimore Gas Appliance & Mfg. Co.
Century Stove & Mfg. Co.
Crane Co., Wm. M.
Equitable Meter Co.
Fuller-Warren Co.
Gehnrich Indirect Heat Oven Co.
General Gas Appliance Co.
Grinnell Co., Inc.
Hale Mfg. Co.
Hones, Inc., Charles A.
Hugo Mfg. Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
Kane Mfg. Co. Inc., Wm.
Kemp Mfg. Co., The C. M.
Maxon Furnace & Engineering Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Roper Corp., Geo. D.
Schmidt, G. F.
Selas Co.
Surface Combustion Co.
Tappan Stove Co.
Wales Co.
Wolff Gas Radiator Co., A. H.
Young Brothers Co.
Lighting
Crane Co., Wm. M.
Lindsay Light Co.
Welsbach Co.
BY-PRODUCT RECOVERY APPARATUS
Bartlett Hayward Co.
Foundation Oven Corp.
Gas Machinery Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Semet-Solvay Co.
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
CALORIMETER ACCESSORIES
American Meter Co. Inc.
Connelly Iron Sponge & Governor Co.
Lambert Meter Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
CALORIMETERS
American Meter Co. Inc.
Connelly Iron Sponge & Governor Co.
Cutler-Hammer Mfg. Co.
Griffin & Co., John J.
Maryland Meter Works
McDonald & Co., D.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

Recording Gas
Cutler-Hammer Mfg. Co.
Precision Instrument Co.
Coal & Gas
American Meter Co., Inc.
Connelly Iron Sponge & Governor Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

CASES, METER
American Meter Co., Inc.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Pittsburgh Meter Co.
Sprague Meter Co.

CASING & TUBING (Steel)
National Tube Co.

CASTINGS
Brass
Baltimore Gas Appliance & Mfg. Co.
Crane Co., Wm. M.
Grinnell Co. Inc.
Metric Metal Works
National Machine Works
Robertshaw Thermostat Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Wehrle Co
Western Gas Construction Co.
Gray Iron
Baltimore Gas Appliance & Mfg. Co.
Bartlett Hayward Co.
Cleveland Co-Operative Stove Co.
Crane Co., Wm. M.
Davis & Farnum Mfg. Co.
Eriez Stove & Mfg. Co.
Grinnell Co. Inc.
Isbell-Porter Co.
Home Stove & Foundry Co.
Howard Stove Co.
National Machine Works
Russell Engineering Co.
Security Stove & Mfg. Co.
Sexton Stove & Mfg. Co., S. B.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Wehrle Co.
Western Gas Construction Co.
Pipe & Specials
Banner Iron Works
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Grinnell Co. Inc.
Isbell-Porter Co.
National Machine Works
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
Western Gas Construction Co.

CEMENT
High Temperature
Gautier & Co., J. H.
Improved Equipment Co.
John-Manville Inc.
Missouri Fire Brick Co.
Monarch Engineering & Mfg. Co.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Russell Engineering Co.
U. G. I. Contracting Co.
Roof
Johns-Manville Inc.

CHARGING MACHINES (Retort, Through Retort, Combined Charging and Discharging)
Bartlett Hayward Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Parker-Russell Mining & Mfg. Co.
Phillips, Lang & Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Mfg. Co.
West Gas Improvement Co. of America, Inc.

CHEMICAL & GAS TESTING APPARATUS
Connelly Iron Sponge & Governor Co.
Precision Instrument Co.
U. G. I. Contracting Co.

CHEMICAL APPARATUS (Lead Lined)
United Lead Co.

CHIMNEYS, RADIAL BRICK
Alphons Custodis Chimney Construction Co.
Russell Engineering Co.

CHUTES (Coal, Coke, Ash)
American Gas Construction Co.
Beaumont Co., R. H.
Cruse-Kemper Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Mfg. Co.
Western Gas Construction Co.

CLAMPS & SLEEVES, PIPE
Davis & Farnum Mfg. Co.
Dresser Mfg. Co., S. R.
Grinnell Co. Inc.
National Machine Works
Steere Engineering Co.

CLAMPS, SERVICE
Hays Mfg. Co.
Mueller Mfg. Co H.
Safety Gas Main Stopper Co.

CLEANERS, SERVICE
Lambert Meter Co.
Superior Meter Co.

COAL
Logan County Coal Corp.
Harlan Co-Operative Coal Co.

COAL TAR PRODUCTS & CHEMICALS
Barrett Co.
Parker-Russell Mining & Mfg. Co.
Semet Solvay Co.

COCKS
Gas Engine
Claus Automatic Gas Cock Co.
Hays Mfg. Co.
Standard Brass Works
Lighting
Standard Brass Works
Range & Water Heater
A-B Stove Co.
Acme Brass Works
Ajax Brass & Iron Co.
Claus Automatic Gas Cock Co.
Detroit Brass & Malleable Works
General Gas Appliance Co.
Grinnell Co. Inc.
Hays Mfg. Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
Lattimer Stevens Co.
McRae & Roberts Co.
Mueller Mfg. Co., H.
Peninsular Brass Works
Roberts Brass Mfg. Co.
Roper Corp., Geo. D.
Standard Brass Works
Service & Meter
A-B Stove Co.
Ajax Brass & Iron Co.
Claus Automatic Gas Cock Co.
Detroit Brass & Malleable Works
General Gas Appliance Co.
Grinnell Co. Inc.
Hays Mfg. Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
Kitson Co.
Lattimer Stevens Co.
Mueller Mfg. Co., H.
Peninsular Brass Works
Roberts Brass Mfg. Co.

COILS, COPPER
Pittsburg Water Heater Co.

COLLECTORS, DUST
Sturtevant Co., B. F.

COMPOUNDS FOR CLEANING GAS METERS & RANGES
Detroit Stove Works
Lambert Meter Co.
Standard Chemical & Supply Co.

COMPRESSORS
American Gas Construction Co.
Connelly Iron Sponge & Governor Co.
Improved Appliance Co.
Parker-Russell Mining & Mfg. Co.
Surface Combustion Co.
Western Gas Construction Co.

Gas
American Gas Construction Co.
Russell Engineering Co.
Selas Co.
Surface Combustion Co.
Western Gas Construction Co.

CONCENTRATORS, AMMONIA
Bartlett Hayward Co.
Gas Machinery Co.
Isbell-Porter Co.
Koppers Co.
Michigan Ammonia Works
Stacey Mfg. Co.
Western Gas Construction Co.

CONDENSERS
American Gas Construction Co.
Bartlett Hayward Co.
Cruse-Kemper Co.
Davidson Co., M. T.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Isbell-Porter Co.
Riter-Conley Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

CONNECTIONS & SEALS, METER
American Meter Co., Inc.
Cleveland Gas Meter Co.
Dresser Mfg. Co., S. R.
Equitable Meter Co.
Griffin & Co., John J.
Helme & McIlhenny
Lambert Meter Co.
Lattimer Stevens Co.
Maryland Meter Works
D. McDonald & Co.
Metric Metal Works
Mueller Mfg. Co., H.
Pittsburgh Meter Co.
Sprague Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

CONTROLLERS
Air & Gas Automatic
American Gas Furnace Co.
Robertshaw Thermostat Co.
Heat
American Gas Furnace Co.
Bristol Co.
Humidity, Pressure, Temperature
Foxboro Co.
Oven Heat
Robertshaw Thermostat Co.

CONTROLLING DEVICES, ELECTRIC
Connelly Iron Sponge & Governor Co.
Cutler-Hammer Mfg. Co.
For House Heating
American Radiator Co.

CONTROLS, AIR & STEAM
U. G. I. Contracting Co.

COOKERS, DOMESTIC
Baltimore Gas Appliance & Mfg. Co.
Crane Co., Wm. M.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Tappan Stove Co.

COOKING AUXILIARIES
Blodgett Co., G. S.
Commercial Gas Appliance Co.
Crane Co., Wm. M.
Duparquet, Huot & Moneuse Co.
Fuller-Warren Co.
General Gas Appliance Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
Roper Corp., Geo. D.
Scott Gas Appliance Co.

COOLERS
Bartlett Hayward Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.

COOLING SYSTEMS
Bartlett Hayward Co.
Improved Equipment Co.
Stacey Mfg. Co.

COUNTERS, REVOLUTION & TACHOMETERS
Bailey Meter Co.
Bristol Co.
Foxboro Co., Inc.
Schaeffer & Budenberg Mfg. Co.

COUPLINGS
Bartlett Hayward Co.
Claus Automatic Gas Cock Co.
Connersville Blower Co.
Dresser Mfg. Co., S. R.
Pittsburgh Meter Co.
Range, Boiler, Pipe
Pittsburg Water Heater Co.

COVERINGS (Tank, Boiler, Cold & Steam Pipe)
Armstrong Cork & Insulation Co.
Johns-Manville Inc.

CRANES
Young Brothers Co.
Gas Machinery Co.

CUBIC FOOT BOTTLE
American Meter Co. Inc.
Equitable Meter Co.
Superior Meter Co.

CYLINDERS
Davis & Farnum Mfg. Co.
National Machine Works
Riter-Conley Co.
S O S Welding Corp.
Stacey Mfg. Co.
Western Gas Construction Co.

DECALCOMANIA PRODUCTS
Eriez Stove & Mfg. Co.
Meyercord Co. Inc.

DERRICKS, TRENCH
Safety Gas Main Stopper Co.

DETERMINATORS, MOISTURE
U. G. I. Contracting Co.

DIAPHRAGMS, METER
Lambert Meter Co.

DIGESTERS
Riter-Conley Co.
Stacey Mfg. Co.
Western Gas Construction Co.

DISCHARGING MACHINES (Retort & Through Retort)
Bartlett Hayward Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Mfg. Co.
West Gas Improvement Co. of America, Inc.

DISPLACEMENT SYSTEM, TAR
Bartlett Hayward Co.
Gas Machinery Co.
Parker-Russell Mining & Mfg. Co.
Stacey Mfg. Co.
Western Gas Construction Co.

DOMESTIC SCIENCE EQUIPMENT
Roper Corp., Geo. D.
Stacey Mfg. Co.

DOOR, CLEAN OUT
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Isbell-Porter Co
National Machine Works
Parker-Russell Mining & Mfg. Co.
Stacey Mfg. Co.
Western Gas Construction Co.

DRUMS, STATION METER
American Meter Co.

DRYERS
Riter-Conley Co.
Stacey Mfg. Co.
Clothes
Canton Clothes Dryer Co.
General Gas Appliance Co.
Sturtevant Co., B. F.

ECONOMIZERS, FUEL
- Improved Equipment Co.
- Russell Engineering Co.
- Selas Co.
- Sturtevant Co., B. F.

ELEVATORS
- Beaumont Co., R. H.
- Phillips, Lang & Co.
- Ridgway & Son Co., Craig
- U. G. I. Contracting Co.

ENGINEERS & ENGINEERING SERVICE
- American Gas Construction Co.
- Bartlett Hayward Co.
- Beaumont Co., R. H.
- Davis & Farnum Mfg. Co.
- Gas Engineering Co.
- Gas Machinery Co.
- Gautier & Co., J. H.
- Improved Equipment Co.
- Isbell-Porter Co.
- Koppers Co.
- Missouri Fire Brick Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Semet-Solvay Co.
- Stacey Bros. Gas Construction Co.
- Stacey Mfg. Co.
- Steere Engineering Co.
- U. G. I. Contracting Co.
- Western Gas Construction Co.
- West Gas Improvement Co. of America, Inc.

ENGINES
- **Gas**
  - Bartlett Hayward Co.
  - Sturtevant Co., B. F.
- **Steam**
  - Sturtevant Co., B. F.
- **Steam, Uniflow & Counter-flow**
  - Harrisburg Foundry & Machine Works

EVAPORATING APPARATUS
- Bartlett Hayward Co.
- Stacey Mfg. Co.

EXCHANGERS, HEAT
- Bartlett Hayward Co.
- Cruse-Kemper Co.
- Riter-Conley Co.
- Western Gas Construction Co.

EXHAUSTERS
- American Gas Construction Co.
- American Gas Furnace Co.
- Connelly Iron Sponge & Governor Co.
- Connersville Blower Co.
- Gas Engineering Co.
- Gas Machinery Co.
- Improved Appliance Co.
- Isbell-Porter Co.
- Kemp Mfg. Co., C. M.
- Maxon Furnace Engineering Co.
- Monarch Engineering & Mfg. Co.
- Stacey Bros. Gas Construction Co.
- Sturtevant Co., B. F.
- Surface Combustion Co.
- U. G. I. Contracting Co.
- Western Gas Construction Co.
- Wilbraham-Green Blower Co.

EXPERIMENTAL APPARATUS
- American Meter Co. Inc.
- Lambert Meter Co.
- Precision Instrument Co.
- Russell Engineering Co.
- Superior Meter Co.
- Western Gas Construction Co.

EXTRACTORS
- **Dust & Fumes**
  - Gas Engineering Co.
  - Gas Machinery Co.
  - Isbell-Porter Co.
  - Parker-Russell Mining & Mfg. Co.
  - Stacey Mfg. Co.
  - Steere Engineering Co.
  - U. G. I. Contracting Co.
  - Western Gas Construction Co.
- **Tar**
  - Bartlett Hayward Co.
  - Connelly Iron Sponge & Governor Co.
  - Davis & Farnum Mfg. Co.
  - Gas Engineering Co.
  - Isbell-Porter Co.
  - Russell Engineering Co.
  - Steere Engineering Co.
  - U. G. I. Contracting Co.
  - Western Gas Construction Co.

FANS
- Sturtevant Co., B. F.

FAUCETS, DRAIN
- Standard Brass Works

FILTERING FLUE, GAS RANGE
- Commercial Gas Appliance Co.

FIRE CLAY & PRODUCTS
- American Gas Construction Co.
- Gautier & Co., J. H.
- Improved Equipment Co.
- Parker-Russell Mining & Mfg. Co.
- Russell Engineering Co.

FIRST AID EQUIPMENT
- Connelly Iron Sponge & Governor Co.
- U. G. I. Contracting Co.

FITTINGS
- A-B Stove Co.
- Acme Brass Works
- Ajax Brass & Iron Co.
- Bartlett Hayward Co.
- Banner Iron Works
- Claus Automatic Gas Cock Co.
- Crane Co.
- Davis & Farnum Mfg. Co.
- Detroit Brass & Malleable Works
- Dresser Mfg. Co., S. R.
- Eriez Stove & Mfg. Co.
- Gas Engineering Co.
- Gas Machinery Co.
- Grinnell Co. Inc.
- Improved Appliance Co.
- Isbell-Porter Co.
- Kitson Co.
- McRae & Roberts Co.
- Mueller Mfg. Co., H.
- Peninsular Brass Works
- Roberts Brass Mfg. Co.
- Roper Corp., Geo. D.
- Standard Brass Works
- Steere Engineering Co.
- Welsbach Co.
- Western Gas Construction Co.
- **Brass**
  - Ajax Brass & Iron Co.
  - Claus Automatic Gas Cock Co.
  - Superior Meter Co.
- **Malleable Iron**
  - Crane Co.
  - Davis & Farnum Mfg. Co.
  - Detroit Brass & Malleable Works
  - Eriez Stove & Mfg. Co.
  - Lambert Meter Co.
  - Roper Corp., Geo D.
  - Superior Meter Co.
- **Street Main**
  - Banner Iron Works

FIXTURES, LIGHTING (Domes, Portables, etc.)
- General Gas Light Co.
- Welsbach Co.

FLASHLIGHTS & BATTERIES
- Connelly Iron Sponge & Governor Co.
- French Battery & Carbon Co.
- Welsbach Co.

FLOORING, INDUSTRIAL
- Gas Machinery Co.
- Johns-Manville Inc.

FLOORS
- **Iron**
  - Bartlett Hayward Co.
  - Davis & Farnum Mfg. Co.
  - Gas Machinery Co.
  - Isbell-Porter Co.
  - Parker-Russell Mining & Mfg. Co.
  - Stacey Mfg. Co.
  - U. G. I. Contracting Co.
  - Western Gas Construction Co.
- **Steel**
  - Young Brothers Co.

FORGES, GAS-FIRED
- **Blacksmith**
  - American Gas Furnace Co.
  - National Machine Works
- Surface Combustion Co.

Bolt Heading
American Gas Furnace Co.
National Machine Works
Surface Combustion Co.
Rivet Heating
American Gas Furnace Co.
Improved Appliance Co.
National Machine Works
Surface Combustion Co.
Tool Room
Improved Appliance Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Sturtevant Co., B. F.
Surface Combustion Co.

FRYERS, DOUGHNUT & CRULLER
Blodgett Co. Inc., G. S.
Crane Co., Wm. M.
Improved Appliance Co.

FURNACES
American Gas Furnace Co.
Century Stove & Mfg. Co.
Eriez Stove & Mfg. Co.
Estate Stove Co.
Hones, Inc., Charles A.
Improved Appliance Co.
Johnson Gas Appliance Co.
Kemp Mfg. Co., C. M.
Maxon Furnace & Engineering Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Russell Engineering Co.
Parker-Russell Mining & Mfg. Co.
Security Stove & Mfg. Co.
Sexton Stove & Mfg. Co., S. B.
Surface Combustion Co.
Young Brothers Co.
Air Tempering
American Gas Furnace Co.
National Machine Works
Annealing
American Gas Furnace Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Surface Combustion Co.
Assaying
American Gas Furnace Co.
Surface Combustion Co.
Case Hardening
American Gas Furnace Co.
Johnson Gas Appliance Co.
National Machine Works
Russell Engineering Co.
Surface Combustion Co.
Cauldron
American Gas Furnace Co.
Improved Appliance Co.
National Machine Works
Surface Combustion Co.
Confectioners
American Gas Furnace Co.
Crane Co., Wm. M.
Improved Appliance Co.
National Machine Works
Surface Combustion Co.
Crucible
American Gas Furnace Co.
Johnson Gas Appliance Co.
National Machine Works
Surface Combustion Co.
Cyanide & Hardening
American Gas Furnace Co.
National Machine Works
Surface Combustion Co.
Enameling
American Gas Furnace Co.
Porcelain Enamel & Mfg. Co.
Surface Combustion Co.
Forging
American Gas Furnace Co.
Improved Appliance Co.
National Machine Works
Surface Combustion Co.
Galvanizing
American Gas Furnace Co.
Gas Blast
American Gas Furnace Co.
National Machine Works
Riter-Conley Co.
Surface Combustion Co.
Melting Metal & Heat Treating
American Gas Furnace Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
National Machine Works
Safety Gas Main Stopper Co.
Surface Combustion Co.
Muffle
American Gas Furnace Co.
Improved Appliance Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Surface Combustion Co.
Oven
American Gas Furnace Co.
Improved Appliance Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Surface Combustion Co.
Plating
American Gas Furnace Co.
Soldering
American Gas Furnace Co.
American Meter Co., Inc.
Crane Co., Wm. M.
Johnson Gas Appliance Co.
Roper Corp., Geo. D.
Surface Combustion Co.
Special
American Gas Furnace Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Surface Combustion Co.
Tempering
American Gas Furnace Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
National Machine Works
Surface Combustion Co.
Tinning
American Gas Furnace Co.
Improved Appliance Co.
National Machine Works
Surface Combustion Co.
Tool Dressing
American Gas Furnace Co.
Improved Appliance Co.
National Machine Works
Surface Combustion Co.

GAS ANALYSIS APPARATUS
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Connelly Iron Sponge & Governor Co.
Foxboro Co., Inc.
Precision Instrument Co.
U. G. I. Contracting Co.

GAS LEAK INDICATORS
Connelly Iron Sponge & Governor Co.

GASOMETER
Davis & Farnum Mfg. Co.
Stacey Mfg. Co.
Superior Meter Co.
Western Gas Construction Co.

GAUGES
American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Gas Machinery Co.
Griffin & Co., John J.
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
National Machine Works
Pittsburgh Meter Co.
Precision Instrument Co.

Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel
U. G. I. Contracting Co.
Western Gas Construction Co.

Ammonia
Bristol Co.
Foxboro Co.

Differential
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Equitable Meter Co.
Foxboro Co., Inc.
National Machine Works
Pittsburgh Meter Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.

Draft
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Foxboro Co., Inc.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

5 in 1, 4 in 1, 3 in 1, 2 in 1,
American Meter Co., Inc.
Bailey Meter Co.
Connelly Iron Sponge & Governor Co.
Foxboro Co., Inc.,
Gas Machinery Co.
Pittsburgh Meter Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

Liquid Level
Foxboro Co., Inc.,

Mercury
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Gas Machinery Co.
National Machine Works
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

Pressure
American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Gas Machinery Co.
Griffin & Co., John J.
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
National Machine Works
Pittsburgh Meter Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel
U. G. I. Contracting Co.
Western Gas Construction Co.

Pressure & Volume
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Schaeffer & Budenberg Mfg. Co.

Portable
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

Recording
American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Equitable Meter Co.
Foxboro Co., Inc
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

Single Tube
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Foxboro Co., Inc.
National Machine Works
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.

Siphon or "U" Tube
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc
Gas Machinery Co.
Lambert Meter Co.
National Machine Works
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
Superior Meter Co.

Test
American Meter Co., Inc.
Bristol Co.
Foxboro Co., Inc.
Schaeffer & Budenberg Mfg. Co.

Vacuum
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Foxboro Co., Inc.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

Water Column
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Foxboro Co., Inc
Gas Machinery Co.
National Machine Works
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
U. G. I. Contracting Co.

GENERATORS, WATER GAS
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Isbell-Porter Co.
National Machine Works
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

GLASSWARE

Chemical
Precision Instrument Co.
Welsbach Co.

Lighting
General Gas Light Co.
Storrs Mica Co.
Welsbach Co.

GOVERNORS
American Gas Construction Co.
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Davis & Farnum Mfg. Co.
Equitable Meter Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
Lambert Meter Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Reynolds Gas Regulator Co.
Russell Engineering Co.
Selas Co.
Sprague Meter Co.
Stacey Mfg. Co.
Western Gas Construction Co.

Boiler Gas Fuel
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
National Machine Works

By-Pass or Reverse Flow
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
Western Gas Construction Co.

District (High & Intermediate Pressure)
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.

District (Low Pressure)
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Isbell-Porter Co.
Reynolds Gas Regulator Co.

Exhauster
Connelly Iron Sponge & Governor Co.
Isbell-Porter Co.
Western Gas Construction Co.

Fuel Gas or Coke Oven
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
Western Gas Construction Co.

Gas Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Davis & Farnum Mfg. Co.
Equitable Meter Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
National Machine Works
Reynolds Gas Regulator Co.
Selas Co.
Sprague Meter Co.
Western Gas Construction Co.

High, Low, Intermediate Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
Sprague Meter Co.

Retort House
Connelly Iron Sponge & Governor Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Isbell-Porter Co.
Russell Engineering Co.

Service, High, Low, Intermediate Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
National Machine Works
Reynolds Gas Regulator Co.
Sprague Meter Co.

Station
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Reynolds Gas Regulator Co.
Sprague Meter Co.

Street
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Isbell-Porter Co.
Reynolds Gas Regulator Co.

GRATE BARS, CAST IRON
Banner Iron Works

GRIDDLES, CAKE
Crane Co., Wm. M.
Roper Corp., Geo. D.

HAMMERS, CAULKING
Bartlett Hayward Co.
Safety Gas Main Stopper Co.

HANGERS, PIPE
Grinnell Co., Inc.
Stacey Mfg. Co

HEATERS

Air
Improved Appliance Co.
National Machine Works
Roper Corp., Geo. D.
Sturtevant Co., B. F.
Tappan Stove Co.

Drying
Gehnrich Indirect Heat Oven Co.
Improved Appliance Co.

Fireplace
General Gas Light Co.
Grayson Mfg. Co., J. H.
Kennedy-Toombs, Inc.
Slattery & Bro., Inc., J. B.
Strait & Richards Inc.
Welsbach Co.
Wolff Gas Radiator Co., A. H.

Garage
American Radiator Co.
Cleveland Heater Co.
Estate Stove Co.
Gallaher Boiler Co.
Howard Stove Co.
Kidde & Co.
Phillips & Clark Stove Co., Inc.
Sexton Stove & Mfg. Co., S. B.
Sturtevant Co., B. F.
Tappan Stove Co.
Wales Co.
Wehrle Co.

Glue
Crane Co., Wm. M.
Improved Appliance Co.
National Machine Works

Indirect Gas Oven
Gehnrich Indirect Heat Oven Co., Inc.
Young Brothers Co.

Pressing & Soldering Iron
American Gas Furnace Co.
Crane Co., Wm. M.
Estate Stove Co.
General Gas Appliance Co.
Hones Inc., Charles A.
Improved Appliance Co.
Johnson Gas Appliance Co.
Kemp Mfg. Co., C M.
Quick Meal Stove Co., Div.
Reliable Stove Co., Div.
Roper Corp., Geo D.
Strait & Richards Inc.

Radiant
Century Stove & Mfg. Co.
Cleveland Co-Operative Stove Co.
Clow & Sons, James B.
Estate Stove Co.
General Gas Light Co.
Grayson Mfg. Co., J. H.
Guardian Gas Appliance Co.
Kennedy-Toombs, Inc.
Ohio State Stove & Mfg. Co.
Peerless Mfg. Co.
Pittsburg Water Heater Co.
Quick Meal Stove Co., Div.
Reliable Stove Co., Div.
Roberts & Mander Stove Co.
Slattery & Bro. Inc., J. B.
Wehrle Co.
Welsbach Co.
Wheeling Corrugating Co.
Wolff Gas Radiator Co., A. H.

Room
American Radiator Co.
American Stove Co.
Baltimore Gas Appliance & Mfg. Co.
Century Stove & Mfg Co.
Clark & Co., Div., George M.
Cleveland Co-Operative Stove Co.
Clow & Sons, James B.
Crane Co., Wm. M.
Dangler Stove Co., Div.
Detroit Stove Works
Elgin Stove & Oven Co.
Eriez Stove & Mfg. Co.
Estate Stove Co.
General Gas Appliance Co.
General Gas Light Co.
Grinnell Co., Inc.

Guardian Gas Appliance Co.
Grayson Mfg. Co., J. H.
Hugo Mfg. Co.
Illinois Specialty Mfg. Co.
Kidde & Co.
Kennedy-Toombs, Inc.
Kompak Co.
Lawson Mfg. Co.
New Process Stove Co., Div.
Ohio State Stove & Mfg. Co.
Peerless Mfg. Co.
Phillips & Clark Stove Co., Inc.
Pittsburg Water Heater Co.
Quick Meal Stove Co., Div.
Reliable Stove Co., Div.
Reznor Mfg. Co.
Roberts & Mander Stove Co.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Slattery & Bro. Inc., J. B.
Strait & Richards Inc.
Sturtevant Co., B. F.
Van Zandt Gas Appliance Co.
Wehrle Co.,
Welsbach Co.
Western Gas Construction Co.
Wheeling Corrugating Co.
Wolff Gas Radiator Co., A. H.

Wall

Van Zandt Gas Appliance Co.

HOISTS

Beaumont Co., R. H.
Safety Gas Main Stopper Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

HOLDERS

American Gas Construction Co.
Banner Iron Works
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Riter-Conley Co.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.

HOODS, RANGE

Crane Co., Wm. M.
Roper Corp., Geo. D.

HOPPERS

Bartlett Hayward Co.
Beaumont Co., R. H.
Riter-Conley Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.

HOT PLATES

American Stove Co.
A-B Stove Co.
Baltimore Gas Appliance & Mfg. Co.
Century Stove & Mfg. Co.
Clark & Co., Div., Geo. M.
Crane Co., Wm. M.
Dangler Stove Co., Div.
Detroit Stove Works
Elgin Stove & Oven Co.
Eriez Stove & Mfg. Co.
Fuller-Warren Co.
General Gas Appliance Co.
Globe Stove & Range Co.
Howard Stove Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
Michigan Stove Co.
National Stove Co., Div.
New Process Stove Co., Div.
Ohio State Stove & Mfg. Co.
Peerless Mfg. Co.
Peninsular Stove Co.
Rathbone, Sard & Co.
Reliable Stove Co.
Roberts & Mander Stove Co.
Roper Corp., Geo. D.
Quick Meal Stove Co.
Slattery & Bro. Inc., J. B.
Tappan Stove Co.
Union Stove Works
Wehrle Co.
Weir Stove Co.
Wheeling Corrugating Co.
Wolff Gas Radiator Co. A. H.

HYDROMETERS

Schaeffer & Budenberg Mfg. Co.

HYGROMETERS

Foxboro Co., Inc.
U. G. I. Contracting Co.

INCANDESCENT CLAY

Century Stove & Mfg. Co.

INCINERATORS

Estate Stove Co.
Guardian Gas Appliance Co.
Ruud Mfg. Co.

INDICATORS

Air Speed

Bacharach Industrial Instrument Co.
Foxboro Co., Inc
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

B.t.u.

U. G. I. Contracting Co.

CO

Bacharach Industrial Instrument Co.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.
U. G. I. Contracting Co.

Draft

Bacharach Industrial Instrument Co.
Bailey Meter Co.

Engine

Bacharach Industrial Instrument Co.

INSTRUMENTS (Measuring, Testing & Recording)

American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co., Inc.
Lambert Meter Co., Inc.
Maryland Meter Works
Metric Metal Works
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Schaeffer & Budenberg Mfg. Co.
Steere Engineering Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel
U. G. I. Contracting Co.
Western Gas Construction Co.

INSULATING MATERIALS

American Gas Construction Co.
America Lava Corp.
Armstrong Cork & Insulation Co.
Cutler-Hammer Mfg. Co.
Davis & Farnum Mfg. Co.
Johns-Manville Inc.
Quigley Furnace Specialties Co.
Storrs Mica Co.

Oven & Water Heater

Johns-Manville Inc.

IRONS (Gas)

A-B Stove Co.
Benson Mfg. Co.
Crane Co., Wm. M.
General Gas Light Co.
Johnson Gas Appliance Co.
Milwaukee Gas Specialty Co.
Strause Gas Iron Co.
Welsbach Co.

JOINT RUNNERS

Safety Gas Main Stopper Co.

KETTLES

Confectioners

Improved Appliance Co.

Galvanizing

Riter-Conley Co.

Soda

Improved Appliance Co.
National Machine Works
Young Brothers Co.

Soup
Improved Appliance Co.
National Machine Works

KILNS
Cruse-Kemper Co.
General Gas Appliance Co.
Improved Appliance Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Sturtevant Co., B. F.
Surface Combustion Co.

For Firing China, Glass & Pottery
Drakenfeld & Co., Inc., B. F.
General Gas Appliance Co.
Russell Engineering Co.
Surface Combustion Co.

LABORATORY (For Testing Fire Brick, Refractories, etc.)
Surface Combustion Co.

LABORATORY INVESTIGATIONS
U. G. I. Contracting Co.

LADLES, HOT METAL
Riter-Conley Co.
Safety Gas Main Stopper Co.

LAMPS

Gas Arc
General Gas Light Co.
Welsbach Co.

Street & Outdoor
Welsbach Co.

LIGHTERS

Cigar
Milwaukee Gas Specialty Co.

Cooker
Strause Gas Iron Co.

Range
Claus Automatic Gas Cock Co.
Michigan Stove Co.
Milwaukee Specialty Co.
Roper Corp., Geo. D.
Safety Gas Lighter Co.
Sherwood Co., J. M.
Strause Gas Iron Co.
Welsbach Co.

LIGHTING INCIDENTALS
General Gas Light Co.
Storrs Mica Co.
Welsbach Co.

LOGS, GAS
Century Stove & Mfg. Co.
Slattery & Bro. Inc., J. B.
Strait & Richards Inc.
Van Zandt Gas Appliance Co.

LUX MATERIAL
Alpha Lux Co., Inc.
Iron Hydroxide Co.

MACHINERY

Coal & Coke Bagging
Bartlett Hayward Co.
Beaumont Co., R. H.

Coal & Coke Handling (Conveying, Crushing, Screening)
American Gas Construction Co.
Bartlett Hayward Co.
Beaumont Co., R. H.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Phillips, Lang & Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Stephens-Adamson Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
West Gas Improvement Co. of America, Inc.

Special
National Machine Works
Riter-Conley Co.
Western Gas Construction Co.

MACHINES

Ironing
American Ironing Machine Co.
Johnson Gas Appliance Co.

Washing
American Ironing Machine Co.
Detroit Washing Machine Corp.
"1900" Washer Co.

MAINS, STREET
American Gas Construction Co.
S O S Welding Corp.

MANHOLE FRAMES & COVERS
Banner Iron Works

MANOMETERS
Bacharach Industrial Instrument Co.

MANTLES, GAS LIGHTING
General Gas Light Co.
Welsbach Co.

METAL RECEPTACLES
American Gas Furnace Co.
Crane Co., Wm. M.
Gehnrich Indirect Heat Oven Co.
Hones Inc., Charles A.
Improved Appliance Co.
National Machine Works
Surface Combustion Co.
United Lead Co.

METERS
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Cleveland Gas Meter Co.
Connersville Blower Co.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Griffin & Co., John J.
Helme & McIlhenny
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
Metric Metal Works
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Rotary Meter Co.
Sprague Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

Air
American Gas Construction Co.
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Gas Machinery Co.
Metric Metal Works
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Sprague Meter Co.
Superior Meter Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

Boiler
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Pittsburgh Meter Co.
Schaeffer & Budenberg Mfg. Co.

Burner Test
American Meter Co., Inc.
Lambert Meter Co.
Superior Meter Co.

Cast Iron Gas
American Meter Co.
Cleveland Gas Meter Co.
Equitable Meter Co.
Pittsburgh Meter Co.
Sprague Meter Co.

Coal
Bailey Meter Co.

Complaint
American Meter Co.
Superior Meter Co.

Consumers
American Meter Co., Inc.
Cleveland Gas Meter Co.
Equitable Meter Co.
Lambert Meter Co.

Pittsburgh Meter Co.
Sprague Meter Co.
Superior Meter Co.

Experimental
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Lambert Meter Co.
Precision Instrument Co.
Sprague Meter Co.
Superior Meter Co.

Filling Station
Pittsburgh Meter Co.

Flow
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Foxboro Co., Inc.
Lambert Meter Co.
Pittsburgh Meter Co.
Superior Meter Co.
Western Gas Construction Co.

Fluid
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Metric Metal Works
Republic Flow Meters Co.

Gas
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Cleveland Gas Meter Co.
Connersville Blower Co.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Griffin & Co., John J.
Helme & McIlhenny
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
Metric Metal Works
Pittsburgh Meter Co.
Precision Instrument Co.
Republic Flow Meters Co.
Rotary Meter Co.
Sprague Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

High Pressure Distribution
American Meter Co., Inc.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Republic Flow Meters Co.
Sprague Meter Co.

High Pressure Iron Case
American Meter Co., Inc.
Equitable Meter Co.
Pittsburgh Meter Co.
Sprague Meter Co.

Industrial Consumers
American Meter Co., Inc.
Bailey Meter Co.
Cutler-Hammer Mfg. Co.
Pittsburgh Meter Co.
Sprague Meter Co.

Iron Case
American Meter Co., Inc.
Cleveland Gas Meter Co.
Equitable Meter Co.
Pittsburgh Meter Co.
Sprague Meter Co.

Laboratory
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Lambert Meter Co.
Precision Instrument Co.
Superior Meter Co.

Large Capacity
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Cleveland Gas Meter Co.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Sprague Meter Co.

Oil
American Gas Construction Co.
Pittsburgh Meter Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

Oxygen
American Meter Co., Inc.
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Superior Meter Co.
Western Gas Construction Co.

Oxygen & Hydrogen
Bacharach Industrial Instrument Co.
Lambert Meter Co.
Sprague Meter Co.

Prepayment
American Meter Co., Inc.
Cleveland Gas Meter Co.
Sprague Meter Co.

Station
American Meter Co.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Connersville Blower Co.
Cutler-Hammer Mfg. Co.
Equitable Meter Co.
Foxboro Co., Inc.
Pittsburgh Meter Co.
Superior Meter Co.
Western Gas Construction Co.

Steam
American Meter Co. Inc.
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Gas Machinery Co.
Metric Metal Works
Republic Flow Meter Co.
Western Gas Construction Co.

Test
American Meter Co. Inc.
Bacharach Industrial Instrument Co.
Equitable Meter Co.
Foxboro Co. Inc.
Lambert Meter Co.
Pittsburgh Meter Co.
Precision Instrument Co.
Sprague Meter Co.
Superior Meter Co.

Water
Bailey Meter Co.
Pittsburgh Meter Co.

Wet Test
American Meter Co. Inc.
Lambert Meter Co.
Pittsburgh Meter Co.
Precision Instrument Co.
Superior Meter Co.

MIXERS, GAS & AIR
American Gas Furnace Co.
Baltimore Gas Appliance & Mfg. Co.
Century Stove & Mfg. Co.
Crane Co., Wm. M.
Detroit Brass & Malleable Works
Eriez Stove & Mfg. Co.
Fuller-Warren Co.
General Gas Appliance Co.
Grinnell Co., Inc.
Hale Mfg. Co.
Hays Mfg. Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
Kemp Mfg. Co., C. M.
Maxon Furnace & Engineering Co.
Monarch Engineering & Mfg. Co.
National Machine Works
Roper Corp., Geo D.
Schmidt, G. F.
Selas Co.
Strait & Richards, Inc.
Surface Combustion Co.

MOTORS
Sturtevant Co., B F

MOUTHPIECES, RETORT
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Western Gas Construction Co.

OFFICE LABOR SAVING DEVICES
Addressograph Co.
Burroughs Adding Machine Co.
Elliott-Fisher Co.
Kalamazoo Loose-Leaf Binder Co.
Remington Typewriter Co.
Tallman, Robbins & Co.

Accounting Machines
Remington Typewriter Co.
Burroughs Adding Machine Co.

Accounting Supplies
Kalamazoo Loose-Leaf Binder Co.
Tallman, Robbins & Co.

Adding Machines
Burroughs Adding Machine Co.

Billing Machines
Burroughs Adding Machine Co.

Bookkeeping, Calculating, Ledger Posting Machines
Burroughs Adding Machine Co.

Bookkeeping Equipment
Kalamazoo Loose-Leaf Binder Co.

Card Record Systems & Supplies
Tallman, Robbins & Co.

Loose-Leaf Systems & Supplies
Kalamazoo Loose-Leaf Binder Co.
Tallman, Robbins & Co.

Typewriting Accounting Machines
Remington Typewriter Co.

OIL, DIAPHRAGM
American Meter Co. Inc.
Griffin & Co., John J.
Lambert Meter Co.
Maryland Meter Works
Sprague Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

OVENS

Annealing
American Gas Furnace Co.
Blodgett Co., G. S.
Crandall-Pettee Co.
Gehnrich Indirect Heat Oven Co.
General Gas Appliance Co.
Grinnell Co. Inc.
Monarch Engineering & Mfg. Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Surface Combustion Co.
Young Brothers Co.

Baking & Cooking
Blodgett Co., G. S.
Clark & Co., Div., Geo. M.
Crandall-Pettee Co.
Crane Co., Wm. M.
Elgin Stove & Oven Co.
Estate Stove Co.
Dangler Stove Co. Div.
Fuller-Warren Co.
General Gas Appliance Co.
Grinnell Co. Inc.
Improved Appliance Co.
Meek Oven Mfg. Co.
National Stove Co. Div.,
Ohio State Stove & Mfg. Co.
Quick Meal Stove Co. Div.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Sheet Metal Specialty Co.
Steiner & Co., Inc., E. E.
Surface Combustion Co.
Union Steel Products Co., Ltd.
Wheeling Corrugating Co.

By-Product
American Gas Construction Co.
Belgian American Coke Ovens Corp.
Gas Machinery Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Semet-Solvay Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.

Core & Mold
Blodgett Co., G. S.
Gehnrich Indirect Heat Oven Co.
Improved Appliance Co.
Surface Combustion Co.
Young Brothers Co.

Drying
American Gas Furnace Co.

Fireless Baking & Cooking
Chambers Mfg. Co.

Japanning & Enameling
American Gas Furnace Co.
Blodgett Co., G. S.
Crandall-Pettee Co.
Gehnrich Indirect Heat Oven Co.
General Gas Appliance Co.
Grinnell Co., Inc.
Monarch Engineering & Mfg. Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Surface Combustion Co.
Young Brothers Co.

Laboratory
Young Brothers Co.

Warming
Blodgett Co., G. S.
Crane Co., Wm. M.
Elgin Stove & Oven Co.
General Gas Appliance Co.
Improved Appliance Co.
Meek Oven Mfg. Co.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Union Steel Products Co. Ltd.
Wheeling Corrugating Co.

OXIDE
Alpha Lux Co.
American Gas Construction Co.
Connelly Iron Sponge & Governor Co.
Gas Purifying Materials Co.
Iron Hydroxide Co.
Iron Oxide Products Inc.

PACKING

Pipe
Connelly Iron Sponge & Governor Co.
Grinnell Co. Inc.
Johns-Manville Inc.
United Lead Co.

Rod, Plunger, Piston, Flange
Connelly Iron Sponge & Governor Co.
Johns-Manville Inc.

Purifier Box
Gas Machinery Co.
Johns-Manville Inc.

PAINT

Holder
Stacey Mfg. Co.

Meter
Equitable Meter Co.
Lambert Meter Co.
Sprague Meter Co.
Tufts Meter Works, Nathaniel
Superior Meter Co.

Outside Steel Works
Johns-Manville Inc.

PAINTING (Holders & General)
U. G. I. Contracting Co.

PHOTOMETERS
American Gas Construction Co.
American Meter Co. Inc.
Connelly Iron Sponge & Governor Co.
Griffin & Co., John J.
Lambert Meter Co.
Maryland Meter Works
McDonald & Co., D.
Tufts Meters Works, Nathaniel
U. G. I. Contracting Co.

PILOTS
American Lava Corp.

PIPE
Cast Iron
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Isbell-Porter Co.
Russell Engineering Co.
Stacey Mfg. Co.
Steere Engineering Co.
Dipped
Riter-Conley Co.
Flanged
Davis & Farnum Mfg. Co.
National Machine Works
Stacey Mfg. Co.
Western Gas Construction Co.
Galvanized Blast
Young Brothers Co.
Lead
United Lead Co.
Lined
United Lead Co.
Riveted Steel
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Riter-Conley Co.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.
Steel
Bartlett Hayward Co.
Riter-Conley Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Steel, Welded
Bartlett Hayward Co.
Cruse-Kemper Co.
Gas Engineering Co.
Grinnell Co. Inc.
National Machine Works
National Tube Co.
Riter-Conley Co.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
Western Gas Construction Co.
Stove
Sexton Stove & Mfg. Co., S. B.
Wrought Iron
Stacey Mfg. Co.
Wrought Iron Welded
Stacey Bros. Gas Construction Co.

PLANTS
Ammonia Recovery
Bartlett Hayward Co.
Gas Machinery Co.
Isbell-Porter Co.
Koppers Co.
Western Gas Construction Co.
By-Product Coke
Belgian American Coke Ovens Corp.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Semet-Solvay Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
By-Product Gas
Bartlett Hayward Co.
Belgian American Coke Ovens Corp.
Gas Machinery Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Carburetted Water Gas
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
National Machine Works
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
Coal Gas
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Gautier & Co., J. H.
Improved Equipment Co.
Koppers Co.
Isbell-Porter Co.
Missouri Fire Brick Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Semet-Solvay Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
West Gas Improvement Co. of America, Inc.
Coal Gas By-Product
Bartlett Hayward Co.
Gas Machinery Co.
Improved Equipment Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
West Gas Improvement Co. of America, Inc.
Western Gas Construction Co.
Oil Gas
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Western Gas Construction Co.
Recovery & Manufacture of By-Products
Bartlett Hayward Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
Parker-Russell Mining & Mfg. Co.
Russell Engineering Co.
Semet-Solvay Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
Porcelain Enamel
Chicago Vitreous Enamel Product Co.
Porcelain Enamel & Mfg. Co.
Surface Combustion Co.
Water Gas
American Gas Construction Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
National Machine Works
Russell Engineering Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.

PLUGS (Testing Mains & Mining Service)
Safety Gas Main Stopper Co.

PORCELAIN ENAMEL PARTS
Baltimore Enamel & Novelty Co.
Chicago Vitreous Enamel Product Co.
Comstock Castle Stove Co.
Enamel Products Co.
Eriez Stove & Mfg. Co.
General Gas Light Co.
Phillips & Clark Stove Co.
Porcelain Enamel & Mfg. Co.
Roper Corp., Geo. D.
Union Steel Products Co. Ltd.

POSTS (Lamp)
- Banner Iron Works
- Davis & Farnum Mfg. Co.
- General Gas Light Co.
- Stacey Mfg. Co.
- Welsbach Co.

PRINTING
- Tallman, Robbins & Co.

PRODUCERS, GAS
- American Gas Construction Co.
- Bartlett Hayward Co.
- Gas Engineering Co.
- Gas Machinery Co.
- Koppers Co.
- Parker-Russell Mining & Mfg. Co.
- Russell Engineering Co.
- Stacey Mfg. Co.
- U. G. I. Contracting Co.
- Western Gas Construction Co.

PROVERS, METER
- American Meter Co. Inc.
- Cleveland Gas Meter Co.
- Equitable Meter Co.
- Griffin & Co., John J.
- Helme & McIlhenny
- Lambert Meter Co.
- Maryland Meter Works
- McDonald & Co., D.
- Metric Metal Works
- Pittsburgh Meter Co.
- Sprague Meter Co.
- Superior Meter Co.
- Tufts Meter Works, Nathaniel

PUMPS
- American Gas Construction Co.
- Connersville Blower Co.
- Davidson Co., M. T.
- Gas Machinery Co.
- Monarch Engineering & Mfg. Co.
- Roper Corp., Geo. D.
- Selas Co.
- Superior Meter Co.
- Tufts Meter Works, Nathaniel
- Western Gas Construction Co.

Drip
- American Meter Co. Inc.
- Connelly Iron Sponge & Governor Co.
- Connersville Blower Co.
- Griffin & Co., John J.
- Roper Corp., Geo. D.

PURCHASERS OF AMMONIACAL LIQUOR
- Michigan Ammonia Works

PURIFIERS
- American Gas Construction Co.
- Bartlett Hayward Co.
- Connelly Iron Sponge & Governor Co.
- Cruse-Kemper Co.
- Davis & Farnum Mfg. Co.
- Gas Engineering Co.
- Gas Machinery Co.
- Improved Equipment Co.
- Isbell-Porter Co.
- Koppers Co.
- Parker-Russell Mining & Mfg. Co.
- Riter-Conley Co.
- Russell Engineering Co.
- Stacey Bros. Gas Construction Co.
- Stacey Mfg. Co.
- Steere Engineering Co.
- U. G. I. Contracting Co.
- Western Gas Construction Co.

PURIFYING MATERIALS
- Alpha Lux Co., Inc.
- American Gas Construction Co.
- Connelly Iron Sponge & Governor Co.
- Gas Purifying Materials Co.
- Iron Hydroxide Co.
- Iron Oxide Products, Inc.
- Lyon, Eph
- Western Gas Construction Co.

PYROMETERS (Indicating & Recording)
- American Gas Construction Co.
- Bristol Co.
- Connelly Iron Sponge & Governor Co
- Foxboro Co. Inc.
- Precision Instrument Co.
- Schaeffer & Budenberg Mfg. Co.
- Surface Combustion Co.

RACKS (Oven & Broiler Wire)
- Union Steel Products Co. Ltd.

RADIANTS & BACK WALLS
- General Gas Light Co.
- Schmidt, G. F.
- Welsbach Co.

RADIATORS, GAS-FIRED STEAM
- American Gas Appliance Co.
- Clow & Sons, James B.
- Crane Co., Wm. M.
- Dangler Stove Co. Div.
- Eriez Stove & Mfg. Co.
- Grinnell Co. Inc.
- Hugo Mfg. Co.
- Improved Appliance Co.
- Kemp Mfg. Co., C. M.
- Kompak Co.
- Kidde & Co.
- Slattery & Bro. Inc., J. B.
- Wolff Gas Radiator Co., A. H.

RANGES

Combination Gas & Coal
- A-B Stove Co.
- Baltimore Gas Appliance & Mfg. Co.
- Reliable Stove Co. Div.
- Roper Corp., Geo. D.
- Walker & Pratt Mfg. Co.

Domestic Gas
- A-B Stove Co.
- American Range & Foundry Co.
- American Stove Co.
- Baltimore Gas Appliance & Mfg. Co.
- Bartlett & Co. Inc.
- Brunner Stove Co.
- Century Stove & Mfg. Co.
- Chambers Mfg. Co.
- Clark & Co., Geo. M.
- Cleveland Co-Operative Stove Co.
- Comstock-Castle Stove Co.
- Crane Co., Wm. M.
- Cribben & Sexton Co.
- Dangler Stove Co. Div.
- Detroit Stove Works
- Eriez Stove & Mfg. Co.
- Estate Stove Co.
- Fuller-Warren Co.
- General Gas Appliance Co.
- Globe Stove & Range Co.
- Home Stove & Foundry Co.
- Howard Stove Co.
- Malleable Iron Range Co.
- Michigan Stove Co.
- Moffats, Limited
- National Stove Co. Div.
- New Process Stove Co. Div.
- Ohio State Stove & Mfg. Co.
- Peerless Mfg. Co.
- Peninsular Stove Co., The
- Phillips & Clark Stove Co.
- Quick Meal Stove Co. Div.
- Rathbone, Sard & Co.
- Reliable Stove Co. Div.
- Roberts & Mander Stove Co.
- Roper Corp., Geo. D.
- Scott Gas Appliance Co. Inc.
- Security Stove & Mfg. Co.
- Sexton Stove & Mfg. Co., S. B.
- Sherwood Co., J. M.
- Slattery & Bro. Inc., J. B.
- Tappan Stove Co.
- Trenkamp Stove & Mfg. Co.
- Union Stove Works
- Vesta Gas Range & Mfg. Co.
- Walker & Pratt Mfg. Co.
- Wehrle Co.
- Weir Stove Co.
- Wheeling Corrugating Co.
- Wincroft Stove Works

Domestic Fireless
- Chambers Mfg. Co.

Hotel
- American Stove Co.
- Baltimore Gas Appliance & Mfg. Co.
- Clark & Co. Div., Geo. M.
- Comstock-Castle Stove Co.
- Crane Co., Wm. M.
- Dangler Stove Co., Div.
- Detroit Stove Works

Duparquet, Huot & Moneuse Co.
Estate Stove Co.
Fuller-Warren Co.
General Gas Appliance Co.
Michigan Stove Co.
Quick Meal Stove Co. Div.
Reliable Stove Co. Div.
Roberts & Mander Stove Co.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.

RECEIVERS, AIR EXPANSION TANK
Riter-Conley Co.
Roper Corp., Geo. D.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.

RECORDERS

CO_2
Foxboro Co. Inc.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

Draft
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Foxboro Co. Inc.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

Gravity
Bailey Meter Co.
Precision Instrument Co.

Pressure
Bacharach Industrial Instrument Co.
Bailey Meter Co.
Bristol Co.
Equitable Meter Co.
Foxboro Co. Inc.
Precision Instrument Co.
Schaeffer & Budenberg Mfg. Co.

SO_2
Precision Instrument Co.

Vacuum
Bacharach Industrial Instrument Co.
Bristol Co.

REFRACTORY MATERIALS
Gas Machinery Co.
Gautier & Co., J. H.
Harbison-Walker Refractories Co.
Improved Equipment Co.
Johns-Manville Inc.
Missouri Fire Brick Co.
Monarch Engineering & Mfg. Co.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Riter-Conley Co.
Russell Engineering Co.
Schmidt, G. F.
Stacey Bros. Gas Construction Co.
United States Refractories Corp.

REGULATORS
American Gas Construction Co.
American Gas Furnace Co.
Bryant Heater & Mfg. Co.
Chaplin-Fulton Mfg. Co.
Claus Automatic Gas Cock Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Equitable Meter Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Mueller Mfg. Co., H.
National Machine Works
Reynolds Gas Regulator Co.
Selas Co.
Sprague Meter Co.
Stacey Bros. Gas Construction Co.
Steere Engineering Co.
Western Gas Construction Co.

Gas, Automatic Cut-Off
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Equitable Meter Co.
Ofeldt Gas Fired Boiler Co.
Robertshaw Thermostat Co.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.

High Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.
Western Gas Construction Co.

House Service
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Reynolds Gas Regulator Co.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.
National Machine Works

Low & High Pressure
American Gas Construction Co.
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co. Inc.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.

Pressure
Foxboro Co. Inc.
Reynolds Gas Regulator Co.
Schaeffer & Budenberg Mfg. Co.
Sprague Meter Co.

Steam
Robertshaw Thermostat Co.

Temperature
American Gas Furnace Co.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Foxboro Co. Inc.
New Process Stove Co.
Robertshaw Thermostat Co.
Schaeffer & Budenberg Mfg. Co.
Western Gas Construction Co.
Wilson Co., H. A.

Vacuum
Chaplin-Fulton Mfg. Co.
Connersville Blower Co.

Water
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Geyser Sales Co.
Ofeldt Gas Fired Boiler Co.
Robertshaw Thermostat Co.
Schaeffer & Budenberg Mfg. Co.

REPAIRS

Gas Appliance
Detroit Stove Works
Western Gas Construction Co.

Meter
American Meter Co., Inc.
Equitable Meter Co.
Griffin & Co., John J.
Helme & McIlhenny
Lambert Meter Co.
Maryland Meter Works
Metric Metal Works
Pittsburgh Meter Co.
Superior Meter Co.
Tufts Meter Works, Nathaniel

RESUCITATING & FIRST AID DEVICES
Connelly Iron Sponge & Governor Co.
Lungmotor Corp.
U. G. I. Contracting Co.

RETORTS
Bartlett Hayward Co.
Gas Machinery Co. Inc.
Gautier & Co., J. H.
Harbison-Walker Refractories Co.
Improved Equipment Co.
Isbell-Porter Co.
Missouri Fire Brick Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
U. G. I. Contracting Co.
West Gas Improvement Co. of America, Inc.

RIVETERS, PNEUMATIC
Bartlett Hayward Co.

ROASTERS (Coffee, Peanut, Spice)
Improved Appliance Co.
ROOFING
Johns-Manville Inc.
RUST PREVENTIVES
Superior Laboratories
Surface Combustion Co.
Welsbach Co.
SAFETY DEVICES (Gas Masks, Oxygen Breathing Apparatus, Etc.)
Connelly Iron Sponge & Governor Co.
Lambert Meter Co.
Lungmotor Corp.
Mine Safety Appliances Co.
Protecto Safety Appliance Co.
SCRUBBERS
American Gas Construction Co.
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Foundation Oven Corp.
Gas Engineering Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Koppers Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
SELLING AGENTS
American Gas Construction Co.
Geyser Sales Co.
Kidde & Co.
Sherwood Co., J. M.
SETTINGS, BOILER & BENCH
Gas Machinery Co.
Gautier & Co., J. H.
Improved Equipment Co.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Riter-Conley Co.
Russell Engineering Co.
SHELVES (Meter)
Crane Co., Wm. M.
Lattimer-Stevens Co.
Union Steel Products Co., Ltd.
SHIELDS (Radiator)
Hugo Mfg. Co.
SPECIALS, CAST IRON
Banner Iron Works
Bartlett Hayward Co.
Connelly Iron Sponge & Governor Co.
Davis & Farnum Mfg. Co.
Eriez Stove & Mfg. Co.
Gas Machinery Co.
Grinnell Co. Inc.
Improved Equipment Co.
Isbell-Porter Co.
National Machine Works
Parker-Russell Mining & Mfg. Co.
Roper Corp., Geo. D.
Russell Engineering Co.
Sexton Stove & Mfg. Co., S. B.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
SPECIALS (Refractory Material)
American Lava Corp.
Gautier & Co., J. H.
Parker-Russell Mining & Mfg. Co.
Quigley Furnace Specialties Co.
Russell Engineering Co.
SPECIALTIES FOR GAS RANGES
Schmidt, G. F.
STACKS (Steel)
Cruse-Kemper Co.
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Riter-Conley Co.
S O S Welding Corp.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.
STAND PIPES
Bartlett Hayward Co.
Cruse-Kemper Co
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
Russell Engineering Co.
Stacey Mfg. Co.
Western Gas Construction Co.
STEEL WORK, STRUCTURAL
American Gas Construction Co.
Banner Iron Works
Bartlett Hayward Co.
Cruse-Kemper Co
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Improved Equipment Co.
Parker-Russell Mining & Mfg. Co.
Riter-Conley Co.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.
STILLS
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Improved Appliance Co.
Isbell-Porter Co.
S O S Welding Corp.
Stacey Mfg. Co.
Western Gas Construction Co.
Young Brothers Co.
Ammonia
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Isbell-Porter Co.
Koppers Co.
National Machine Works
Stacey Mfg. Co.
Western Gas Construction Co.
Benzol, Toluol
Bartlett Hayward Co.
Cruse-Kemper Co.
Gas Machinery Co.
Koppers Co.
Semet-Solvay Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Water
Improved Appliance Co.
Young Brothers Co.
STOPPERS, GAS MAIN
Connelly Iron Sponge & Governor Co.
STOVES
Confectioners
A-B Stove Co.
American Stove Co.
Clark & Co., Geo. D.
Crane Co., Wm. M.
Crandall-Pettee Co.
Baltimore Gas Appliance & Mfg. Co.
Dangler Stove Co. Div.
Elgin Stove & Oven Co.
Estate Stove Co.
Fuller-Warren Co.
General Gas Appliance Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
Quick Meal Stove Co. Div.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Laundry
A-B Stove Co.
American Stove Co.
Baltimore Gas Appliance & Mfg. Co.
Clark & Co. Div., Geo. M.
Cleveland Co-Operative Stove Co.
Crandall-Pettee Co.
Crane Co., Wm. M.
Dangler Stove Co. Div.
Elgin Stove & Oven Co.
Eriez Stove & Mfg. Co.

Estate Stove Co.
Fuller-Warren Co.
General Gas Appliance Co.
Improved Appliance Co.
Johnson Gas Appliance Co.
Michigan Stove Co.
New Process Stove Co. Div.
Quick Meal Stove Co. Div.
Rathbone, Sard & Co.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Sexton Stove & Mfg. Co., S. B.
Slattery & Bro., Inc., J. B.
Wehrle Co.

SYSTEMS
Condensing
Bartlett Hayward Co.
Isbell-Porter Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
High Pressure
American Gas Construction Co.
Connelly Iron Sponge & Governor Co.
Connersville Blower Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Grinnell Co. Inc.
Kemp Mfg. Co., C. M.
Mueller Mfg. Co., H.
Selas Co.
Surface Combustion Co.
Low Pressure
Selas Co.

TABLES (Brazing and Soldering)
American Gas Furnace Co.

TACHOMETERS
Bristol Co.
Foxboro Co. Inc.
Schaeffer & Budenberg Mfg. Co.

TANKS
American Gas Construction Co.
Bartlett Hayward Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Gas Machinery Co.
Gehnrich Indirect Heat Oven Co.
Improved Appliance Co.
Kompak Co.
Metcalfe-Shaw Corp.
National Tube Co.
Riter-Conley Co.
Roper Corp., Geo. D.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Steere Engineering Co.
Western Gas Construction Co.
Young Brothers Co.

TAR DEHYDRATORS
Metcalfe-Shaw Corp.
Sharples Specialty Co.

THERMOMETERS (Indicating & Recording, all kinds)
American Meter Co. Inc.
Bristol Co.
Connelly Iron Sponge & Governor Co.
Elgin Stove & Oven Co.
Foxboro Co. Inc.
Gas Engineering Co.
Gas Machinery Co.
Grinnell Co. Inc.
Improved Appliance Co.
Lambert Meter Co.
Metric Metal Works
Superior Meter Co.
Tufts Meter Works, Nathaniel
Schaeffer & Budenberg Mfg. Co.
Wehrle Co.
Western Gas Construction Co.

THERMOSTATS (All kinds)
American Radiator Co.
Bryant Heater & Mfg. Co.
Bristol Co.
Claus Automatic Gas Cock Co.
Gas Machinery Co.
Geyser Sales Co.
Kidde & Co.
Minneapolis Heat Regulator Co.
Robertshaw Thermostat Co.
Ryan Co., B.
Van Zandt Gas Appliance Co.
Wilson Co., H. A.

THORIUM
Welsbach Co.

TILE (Refractory)
American Gas Construction Co.
Gas Machinery Co.
Gautier & Co., J. H.
Improved Equipment Co.
Parker-Russell Mining & Mfg. Co.

TIPS
Industrial Burner
American Gas Furnace Co.
American Lava Corp.
Radiant Fire
Schmidt, G. F.
Stove
American Lava Corp.

TOASTERS
Crane Co., Wm. M.
Improved Appliance Co.
Roper Corp., Geo. D.
Wolff Gas Radiator Co., A. H.

TOOLS, PIPE (Caulking, Cutting, Tapping)
Grinnell Co. Inc.
Mueller Mfg. Co., H.
Safety Gas Main Stopper Co.
United Lead Co.

TRAPS, STEAM
Grinnell Co. Inc.
Johns-Manville Inc.
Schaeffer & Budenberg Mfg. Co.
Sturtevant Co., B. F.

TRENCH WORK
American Gas Construction Co.
Connelly Iron Sponge & Governor Co.
Safety Gas Main Stopper Co.

TUBING, FLEXIBLE (And Ends)
Atlantic Tubing Co.
Crane Co., Wm. M.
Eastman Mfg. Co.
General Gas Light Co.
Strause Gas Iron Co.
Welsbach Co.
Wheeling Corrugating Co.

TURBINE, STEAM
Sturtevant Co., B. F.

VACUUM CLEANERS
Sturtevant Co., B. F.

VALVES
Ajax Brass & Iron Co.
Bartlett Hayward Co.
Bryant Heater & Mfg. Co.
Claus Automatic Gas Cock Co.
Connelly Iron Sponge & Governor Co.
Davis & Farnum Mfg. Co.
Detroit Brass & Malleable Works
Gas Machinery Co.
Grinnell Co. Inc.
Hays Mfg. Co.
Improved Appliance Co.
Improved Equipment Co.
Isbell-Porter Co.
Johnson Gas Appliance Co.
Ludlow Valve Mfg. Co.
National Machine Works
Russell Engineering Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
Back Pressure
Chaplin-Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Equitable Meter Co.
Gas Engine
Claus Automatic Gas Cock Co.
Gate
Grinnell Co. Inc.
Ludlow Valve Mfg. Co.
National Machine Works
S O S Welding Corp.
Western Gas Construction Co.

Needle—for Gas Stoves
Acme Brass Works
Claus Automatic Gas Cock Co.
Detroit Brass & Malleable Works
General Gas Appliance Co.
Peninsular Brass Works
McRae & Roberts Co.
Roberts Brass Mfg. Co.
Schmidt, G. F.
Service
Grinnell Co. Inc.
Ludlow Valve Mfg. Co.
National Machine Works
Thermo
Bryant Heater Mfg. Co.
Claus Automatic Gas Cock Co.
Pittsburg Water Heater Co.
Robertshaw Thermostat Co.
Ryan Co., B.
Wilson Co., H. A.
VENTILATORS
Sturtevant Co., B. F.
Young Brothers Co.
WAFFLE IRONS
Crane Co., Wm. M.
Roper Corp., Geo. D.
WARMERS, PLATE
Crane Co., Wm. M.
Duparquet, Huot & Moneuse Co.
General Gas Appliance Co.
Improved Appliance Co.
Roper Corp., Geo. D.
WASHERS
American Gas Construction Co.
Bartlett Hayward Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Russell Engineering Co.
Western Gas Construction Co.
Air
Sturtevant Co., B. F.
Ammonia
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Isbell-Porter Co.
Stacey Mfg. Co.
Western Gas Construction Co.
Water Gas
Bartlett Hayward Co.
Davis & Farnum Mfg. Co.
Gas Machinery Co.
Improved Equipment Co.
Isbell-Porter Co.
Stacey Mfg. Co.
U. G. I. Contracting Co.
Western Gas Construction Co.
WATER HEATERS
A-B Stove Co.
American Radiator Co.
Baltimore Gas Appliance & Mfg. Co.
Bartlett Hayward Co.
Bastian-Morley Co.
Bryant Heater & Mfg. Co.
Clark & Co. Div., Geo. M.
Cleveland Heater Co.
Crane Co., Wm. M.
Dangler Stove Co. Div.
Detroit Stove Works
Estate Stove Co.
General Gas Appliance Co.
Hoffman Heater Co.
Humphrey Co. Div.
Geyser Sales Co.
Kane Mfg. Co. Inc., Wm.
Kidde & Co.
Kompak Co.
Lawson Mfg. Co.
Lovekin Water Heater Co.
Michigan Stove Co.
National Stove Co. Div.
New Process Stove Co. Div.
Peninsular Stove Co.
Philadelphia Stove Co.
Pittsburg Water Heater Co.
Quick Meal Stove Co. Div.
Rathbone, Sard & Co.
Reliable Stove Co. Div.
Roper Corp., Geo. D.
Ryan Co., B.
Ruud Mfg. Co.
Sands Mfg. Co.
Sexton Stove & Mfg. Co., S. B.
Trenkamp Stove & Mfg. Co.
Van Zandt Gas Appliance Co.
Wales Co.
Wolff Gas Radiator Co., A. H.
Gas Range
Baltimore Gas Appliance & Mfg. Co.
Cleveland Heater Co.
Crane Co., Wm. M.
Detroit Stove Works
Estate Stove Co.
General Gas Appliance Co.
Michigan Stove Co.
Roberts & Mander Stove Co.
Roper Corp., Geo. D.
Scott Gas Appliance Co.
Sexton Stove & Mfg. Co., S. B.
Wehrle Co.
Barbers
Crane Co., Wm. M.
Pittsburg Water Heater Co.
Bath
Hoffman Heater Co.
Humphrey Co. Div.
Pittsburg Water Heater Co.
Roper Corp., Geo D.
Tappan Stove Co.
WELDING
American Gas Furnace Co.
Cruse-Kemper Co.
Davis & Farnum Mfg. Co.
Gas Engineering Co.
Grinnell Co. Inc.
National Machine Works
Riter-Conley Co.
Sexton Stove & Mfg. Co., S. B.
S O S Welding Corp.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.
Union Steel Products Co. Ltd.
Western Gas Construction Co.
Young Brothers Co.
WIRE
Union Steel Products Co. Ltd.
YARN, CAULKING
Safety Gas Main Stopper Co.

MAGAZINE PUBLICITY

In the current issue of Scientific American, there is an article entitled, "The Story of Gas," based upon data furnished by the Smithsonian Institution and this Association. Sample copies of the booklet, "Hints for the Housewife," have been sent to the editors of all women's publications and the magazine departments of the principal daily newspapers of the country. During the last Convention trade magazines, devoted to interests allied closely with our own, were furnished with a list of Convention reports and papers, and more than fifty specific requests were received, resulting in a number of published articles. More recently, an article describing the business outlook of the industry for 1923, has been sent to all financial magazines, firms handling public utility securities, and statistical organizations serving investors. The thirty or more editors of gas company publications and the eighteen state committees on public utility information also receive every piece of publicity matter issued by the Association.

Employment Bureau

SERVICES REQUIRED

WANTED—Two men for eastern territory and one for middle west, who can earn not less than $100.00 PER WEEK supervising campaign crews, selling gas appliances of great market possibilities. Made by the the best known manufacturer of gas appliances in the world. Permanent position. Must be hustlers of executive ability. Give full particulars as to present position and experience. Address: A. G. A.
Key No. 04.

WANTED—High class foreman for water gas plant now sending out two million a day. Must be good on plant construction and repair as well as operation. State fully age, experience and salary expected. Answers will be considered confidential. Address A. G. A.
Key No. 06.

WANTED—A high grade commercial man to handle commercial work in a Southern Gas Company in a town of 15,000 people. Must be capable of writing advertisements, arrange displays, and be willing to make a house to house canvass. Salary and commission basis of payment. Address A. G. A.
Key No. 07.

WANTED as Head of the Promotion Division of a gas plant in middle western city of 100,000. Under his direction are meter repair men—trouble men—canvassers and appliance erecting men—a total of about 50 men, also to have charge of the merchandise stock with annual sales of approximately $200,000. A man experienced in handling men and obtaining good work at reasonable cost particularly desired. Salary $3,600.00 per year. Address A. G. A.
Key No. 10

WANTED—Two Industrial Gas Salesmen for middle west city having an attractive gas rate. State experience, salary wanted. Address A. G. A.
Key No. 011.

WANTED—A progressive New England Gas Company selling annually 200 Automatic Water Heaters requires the services of a first class water heater salesman. Must be clean cut with personality and ability to sell consumers and plumbers. A good position for a good man. Give qualifications, age, experience, references and salary desired. Address A. G. A.
Key No. 012.

WANTED—Sales Engineer experienced in designing silica and fire clay Retort Benches and other furnaces. State experience and what acquaintance, if any, with the Gas Trade. Address A. G. A.
Key No. 013.

WANTED—We want a man of long experience on gas main and service work, particularly high pressure, setting and adjusting regulators, etc. State age, experience and salary desired. Address A. G. A.
Key No. 014.

CUSTOMER OWNERSHIP—Wanted, man experienced in customer ownership stock campaigns. Approximately 20,000 gas and electric consumers; about 90,000 population. Advise experience, salary desired, references, etc. Address A. G. A.
Key No. 016.

WANTED—Chief Clerk, 10,000 gas and electric accounts; approximately 14 employees. Property is one of a large group with excellent future prospects. State age, salary desired, references, and submit full and complete details regarding experience. Address A. G. A.
Key No. 017.

SALESMAN WANTED—By a company operating a group of gas and electric companies about to increase their sales force, desire to secure the services of several experienced gas, electric or gas and electric salesmen to sell appliances in their all-year selling organization. Address A. G. A.
Key No. 018.

WANTED—A young technical graduate (about 22 to 27 years of age) for general Physical Testing and Research, by a large eastern gas company. Must have a good knowledge of general physics, particularly electrical measurements, and some gas works' experience. Should be able to plan and execute tests and research work, and prepare comprehensive reports thereon. An exclusively chemically educated man not wanted. Give full particulars in the first letter. Address A. G. A.
Key No. 015.

SERVICES OFFERED

WANTED—Position by a man of large general experience in gas business who has made a special study of sales promotion problems, and who would prove valuable as an assistant to a busy executive in any department. Address A. G. A.
Key No. 134.

WANTED—Position of responsibility as Manager or Industrial Fuel Engineer—18 years varied experience in the gas business. References and service record furnished. Address A. G. A.
Key No. 142.

WANTED—Position as Assistant to Superintendent of either large coal or water gas plant, by young man twenty-five years of age who is now employed by combination coal and water gas plant in South. Experienced in calorimetry, statistics, plant records and general office work and would prove valuable to busy executive. Prefers Southern or Eastern territory, but will consider any location. Address A. G. A.
Key No. 146.

GAS RESEARCH ENGINEER—Now employed by a Government technical bureau, would like position as Testing, Research, or Inspecting Engineer with a large gas company or a chain of gas properties. 37 years of age. Author of several Gevernment, State and Technical journal reports on gas research problems. Active member of several A. G. A. technical committees. Has had several years of practical gas operating experience as chemist and superintendent in addition to gas investigative work. Address A. G. A.
Key No. 149.

YOUNG TECHNICAL GRADUATE with slight amount of gas experience and in valuation work wants position with gas company. Address A. G. A.
Key No. 150.

POSITION WANTED—By-Product, Coke-Oven Executive seeks more responsible connection. Fitted for Chief Chemical Engineer, Assistant-Superintendent or Assistant to Manager. University Graduate. Alexander Hamilton Institute Graduate. Nearly seven years with present 3000 ton plant. Thirty-two years old. Married. Address A. G. A.
Key No. 151.

POSITION WANTED as superintendent of small gas company or as general foreman of large plant. Approximately seventeen years' experience in all branches of manufacture and distribution, high and low pressure systems. Address A. G. A.
Key No. 152.

YOUNG MAN 27 years of age, seven years' experience with president of combination gas, electric, and street railway property, town of 40,000 people, desires new connection. Thoroughly experienced in the handling of correspondence and the compilation of financial, statistical and operating reports and statements, as well as the general work in connection with public utility corporations. Address A. G. A.
Key No. 153.

COMMERCIAL MANAGER OR GAS APPLIANCE SALESMAN—Seven years' experience in all commercial departments of Eastern coal gas company. Five years' experience in selling domestic and industrial gas appliances. Willing to work in office or outside selling. Experienced in handling personnel of the departments. Address A. G. A.
Key No. 154.

COMMERCIAL SECTION

WILLIAM GOULD, Chairman — J. E. DAVIES, Vice-Chairman

LOUIS STOTZ, Secretary

MANAGING COMMITTEE—1923

At Large

BARNES, CYRUS, Boston, Mass.
BARTLETT, C. E., Philadelphia, Pa.
COLLIER, WILLIAM, Poughkeepsie, N. Y.
DUTTON, L. R., Jenkintown, Pa.
EVES, PHILMER, New Haven, Conn.
HANLAN, J. P., Newark, N. J.
HUMPHREY, H. E., New York, N. Y.
JONES, J. B., Bridgeton, N. J.
KAHN, B. B., Hamilton, Ohio
KNAPP, F. H., Pittsburgh, Pa.
MACSWEENEY, J. P., Rochester, N. Y.
MILENER, E. D., Baltimore, Md.
MURRAY, J. J., Biddeford, Me.
MYERS, J. B., Philadelphia, Pa.
NEWMAN, H. H., Trenton, N. J.
POLLITT, L. I., Baltimore, Md.
POST, A. P., Philadelphia, Pa.
QUINN, J. J., Quincy, Mass.
RASCH, W. T., New York, N. Y.
SMITH, D. R., Baltimore, Md.
STANNARD, C. N., Denver, Col.
STEPHANY, E. J., Pittsburgh, Pa.
STETSER, J. R., Gloucester, N. J.
TAYLOR, J. D., Baltimore, Md.

Representing Affiliated Societies

BURKE, E. J., Indianapolis, Ind. (Indiana)
COEL, W. F., Mexico, Mo. (Missouri)
CRAFTS, H. C., Pittsfield, Mass. (N. E. Gas Eng)
CRANKSHAW, J. W., Allentown, Pa. (Pennsylvania)
CRAWFORD, H. M., San Francisco, Cal. (Pacific Coast)
DOERING, H. A., Mt. Vernon, N. Y. (Empire State G. & E.)
FLAUTT, J. J., New Orleans, La. (South Central)
GOSS, A. J., Ottumwa, Ia. (Iowa)
HANLAN, J. P., Newark, N. J. (New Jersey)
JOHNSON, W. B., Toronto, Can. (Canadian)
LEARNED, J. G., Chicago, Ill. (Illinois)
McDONNOLD, H. E., Greenville, S. C. (Southern)
SCHROEDER, A. G., Grand Rapids, Mich. (Michigan)
ST. JOHN, JOHN, Madison, Wis. (Wisconsin)
WILLARD, E. A., Portland, Me. (Gas Sales of N. E.)

CHAIRMEN OF SECTION COMMITTEES ORGANIZED TO DATE

Cooperation with Architects and Builders— R. S. DOULL, New York, N. Y.

Cooperation with the Plumber and Heating Dealer— F. H. KNAPP, Pittsburgh, Pa.

Home Economics Service Bureau—PHILMER EVES, New Haven, Ct.
Industrial Gas—E. J. STEPHANY, Pittsburgh, Pa.
Retail Pricing—A. P. POST, Philadelphia, Pa.
Sales Stimulation—J. E. DAVIES, Chicago, Ill.

Sales Plans for First Three Months of 1923

The sales ideas in the Special Bulletin recently issued by our Sales Stimulation Committee have undoubtedly proven of benefit as is evidenced by the requests for additional copies.

Mr. J. E. Davies, Manager of the Peoples Gas Stores of Chicago, advises us that he has adopted the $2.00 down, extended payments and premium offer and that his 900 merchandise sales for the first six working days of the new year amounted to $52,000.

One of the largest appliance manufacturers has telegraphed for 250 copies of the Sales Bulletin to place in the hands of his salesmen; another requested 100 copies.

If these indications mean anything at all, then our efforts to give a merchandising service to the membership is worth while. The Committee would appreciate knowing to what extent the member companies are putting into practice any or all of the suggestions contained in the Special Sales Bulletin.

The Committee has in mind a national campaign to eliminate the old and obsolete appliances from their lines. This subject will be fully covered in another Special Bulletin to be released within a few weeks. This matter deserves careful consideration and action.

How Do Your Appliance Sales Per Meter Compare with Other Companies?

THERE are at present no available figures covering the dollar gas appliance sales per meter of the A. G. A. company members, nor is there any basis or standard upon which to determine whether a sales organization is performing creditably or otherwise.

It is hoped to correct this condition through the collection at Association Headquarters of information of this character from all member companies. You are asked to make such statistics available to the Association, and send in the information monthly, or as often as may be most convenient.

At present, very few if any, companies know whether their gas appliance sales per meter per year are high, low or indifferent. Who shall say what is a high standard—is it three, four or five dollars per meter per year or more?—no one knows. It is a fact however, that there is a great variance between the dollar sales of our various member companies and it is in order to encourage those with low sales to bring their quota higher, and those at the top to make even better records that we propose to gather such statistics.

It is intended to publish monthly the names of the ten or fifteen companies making the best records of appliance sales per meter in dollars as a mark towards which other companies may strive.

These appliance sales should include services, meter connections or any merchandise or labor which is billed to the customer, from the running of a service in the street to the selling and installing a gas light and mantle up through all the larger appliances. Any gas service appliance that the customer buys and has installed can reasonably be called gas merchandise.

As an illustration:

Company No. 1—with 2000 meters sells $12,000 worth of gas appliances during the year, this is an average of 50c per month or $6.00 for the year.

Company No. 2—with 10,000 meters sells $45,000 worth of gas appliances during the year, a monthly average of .375c or $4.50 for the year.

Company No. 3—with 100,000 meters sells $500,000 worth of gas appliances during the year, a monthly average of .416c or $5.00 for the year.

Now wouldn't it be an incentive for Companies No. 2 and No. 3 to strive for the higher mark established by No. 1 and isn't it logical that Company No. 1 will endeavor to keep in the lead? This friendly rivalry should be a stimulating influence throughout the industry.

The ten or fifteen companies leading each month will be listed on an Honor Roll in the A. G. A. Monthly. Naturally, the standing of the leaders will change from time to time and it is, therefore, important to have the information reported monthly so far as possible by every member company.

TECHNICAL SECTION

F. C. WEBER, Chairman — H. C. WEHNERT, Vice-Chairman

H. W. HARTMAN, Secretary

MANAGING COMMITTEE—1923

At Large

BATES, M. M., Chicago, Ill.
BECKJORD, W. C., New York, N. Y.
BURDICK, R. H., New York, N. Y.
COOK, JR., H. R., Baltimore, Md.
EATON, H. M., Detroit, Mich.
FIELDNER, A. C., Pittsburgh, Pa.
FREEMAN, F. C., Providence, R. I.
HAFTENKAMP, J. P., Rochester, N. Y.
HOWARD, A. C., New York, N. Y.
SERRILL, W. J., Philadelphia, Pa.
SPERR, F. W. Pittsburgh, Pa.
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JOHNSON, G. M., South Bend, Ind. (Indiana)
LYONS, B. F., Beloit, Wis. (Wisconsin)
OTTEN, JR., C. H., Plymouth, Mass. (Gas Sales of N. E.)
PAIGE, C. E., Worcester, Mass., (N. E. Gas Eng.)
RICHARDSON, R. B., Peoria, Ill. (Illinois)
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History and Development of Automatic Control of Water Gas Sets

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UNTIL comparatively recent years the operation of all carburetted water gas generating apparatus has been accomplished by hand, and therefore, largely dependent on the personal element.

The process of making water gas, as we all know, is an intermittent one, the unit of operation being familiarly known as a cycle. These cycles are made up of alternate blows and runs of predetermined lengths, dependent on the kind of fuel, amount of oil, blast pressure, etc. It can readily be understood that for a given combination of these gas-making conditions, there must be a correct combination of blows and runs, and any appreciable digression from this combination would produce unfavorable results.

The efforts of the makers of most water gas apparatus for the past ten or twelve years have been mainly directed towards increase of capacity. These efforts have resulted in more than doubling the original capacities of the sets in some cases and permitting the use of a shorter cycle. By shortening the blow and run periods we have been gradually approaching the ideal condition of continuous operation.

In operating the set the succession of cycles causes a succession of changes from a constant condition. The more frequent the changes in the set and the smaller their magnitude, the more nearly does the set approach an average constant condition. The nearer the approach of the set to the correct average constant condition, consistent with the intermittency of the process, the better will be the results.

As shorter cycles came into use it was found that the work was too severe for

the gas maker and it was necessary to install devices to help him operate the heavy valves with a minimum of physical effort. Hydraulically operated cylinders, and other like apparatus, have been fitted to the valves so that very little manual labor is needed on the part of the gas maker, in so far as the operation of the valves is concerned. This type of apparatus was particularly valuable in the scarcity of labor during the war time when men were independent and could practically choose their work.

The successful operation of the set still depends very largely on the man who operates the valves. His timing of the different parts of the cycle is determined usually by means of an ordinary clock. Unless an elaborate and complicated check system is used, the degree of accuracy of the timing is entirely at the will of this employee. It is the writer's opinion that many of the troubles incident to the manufacture of water gas are directly attributable to careless timing and that considerable economies may be effected when such conditions are improved.

The average workman available for operating water gas apparatus has no technical training but quite readily acquires the routine of operation necessary for good results. This type of man, after considerable experience and training, learns that economical operation of the set depends largely on the condition of the fire. He soon acquires certain "knacks" which are useful in handling the blast, steam, split running, etc. He also learns that "juggling" of the runs will give him a fire condition which makes it less laborious to clean.

The work of running a water gas set by hand is a monotonous and routine matter. Continuous and correct performance of this work requires a mental concentration and alertness which are difficult to sustain under ideal conditions. The atmosphere and environment of a generator house are enervating. Aside from the personal fatigue from standing eight or nine hours, the monotony of the work and the inability to see or realize the direct result therefrom creates a lack of interest and a loss of personal efficiency.

The employee may start his turn in good physical and mental condition. After a few hours the grind begins to tell. Actual observation has proven that in the case of the average employee his accuracy in timing the cycles falls off towards the end of his turn. With large sets and short cycles these lapses and irregularities may easily cause serious losses, especially at present day prices for coal, coke and oil.

In most other industries the history and development have shown that success has followed the substitution of automatic for manual operation and the use of labor-saving devices.

Machine operation give a precision, definiteness and promptness of valve movement impossible to maintain by manual means. A very great advantage is the assurance that a given set of running conditions can be maintained until changed. Shorter cycles can be used than is practical in manual operation and the average constant condition required for maximum efficiency is more readily maintained.

Ours is one of the few important industries in which manual performance of some of the successive and monotonous operations is still generally in use.

Probably the first attempt to substitute automatic for manual operation of a water gas set was made in 1912 by Mr.

John Shaw of the Astoria Light Heat and Power Company, Astoria, Long Island City, New York.

Mr. Shaw's apparatus consisted of a pendulum controlled timing mechanism in which adjustable timing cams operated contacts. Electrically operated compressed air pilot valves made the proper water connections to hydraulic cylinders which operated the valves of the set. The timing mechanism controlled the cycles and the blast and gas valves were operated in separate groups so arranged that the valves in each group would have to operate in correct sequence or the other group would not operate. Correct sequence was secured by interlocking the electrical circuits to the compressed air pilot valves by switches attached to the hydraulic cylinders.

This experimental machine was built by the Bartlett Hayward Company of Baltimore, Maryland, and operated successfully for some time. Its complication, however, prevented its further development.

A more successful attempt was made in 1913 by Mr. C. F. Zeek, Superintendent of the Pensacola, Florida, Gas Company.

A very good description of this apparatus is given in a paper written by Mr. Zeek for the 1915 Convention of the Southern Gas Association published in the proceedings of the Association for that year.

Mr. Zeek found that for some grades of fuel a short cycle was absolutely necessary for good results but it was not practical to run on a cycle shorter than six minutes by hand operation. He, therefore, set about developing an apparatus which would automatically operate the valves of the set on any desired cycle and was quite successful. The resultant machine was inexpensive and simple and operated the set with a very substantial improvement in the results.

Mr. Zeek's apparatus consisted of a series of hydraulic cylinders for operating the valves of the set and a controller, the essential parts of which were cams mounted on a shaft and rotated by a clock mechanism.

The shaft made one revolution per cycle. Fingers were provided on the cams whereby adjustments could be made for changes in the cycle. This apparatus was equipped with safety devices to provide for interruptions in hydraulic service, racing of the cam shaft, etc. All of the valves, except the hot valve, were closed by gravity. Air pressure was used to force the water into the different operating cylinders.

Using this apparatus it was found that a cycle consisting of 1½ minute blow and 2½ minute run was the best for certain grades of coke. Such a cycle would be very difficult, if not impossible, in manual operation.

The first commercially successful automatic machine was invented and developed by Mr. J. H. Taussig of the United Gas Improvement Company of Philadelphia. Mr. Taussig's apparatus was first tried out at the Philadelphia Experimental Plant in 1913 and was later developed into the apparatus now regularly made by the U. G. I. Contracting Company and of which there are a number in successful operation.

In this machine a motor driven timing mechanism slowly rotates adjustable cams. These cams operate small pilot valves which hydraulically operate small cylinders for opening and closing, at the proper time, the master valves which control the hydraulic pressure to cylin-

ders mounted on each of the valves of the set.

This machine is provided with automatic devices whereby the length of the blow is prolonged, if necessary, to bring up the temperature of the set to a predetermined point as indicated by means of a thermo-couple; to indicate by signal lights the position of each valve and to sound an alarm upon failure of a valve to operate. The set can be operated by hand when desired by first by-passing the pilot cylinders. Interlocking of the valves is accomplished by cams actuated by the hand levers of the master valves. A more detailed description of this machine is given in the Appendix.

The Gas Machinery Company of Cleveland, Ohio, and the Western Gas Construction Company at Fort Wayne, Indiana, now manufacture automatic controls which are also described in detail in the Appendix.

The Gas Machinery Company's automatic is built into the regular manually operated control lever system made by this company and so arranged that by throwing a lever the set can be operated by hand when desired. A set of adjustable timing discs are rotated by a one-half horse power electric motor and operate the hand levers direct.

The Western Gas Construction Company's machine, called "The Mechanical Man," consists of a master hydraulic cylinder in a vertical position with ports cut in proper sequence so as to operate the hydraulic cylinders of the valves of the set and to which these ports are connected. The master piston travels slowly up and down within the cylinder distributing the water pressure to the various valve cylinders, thus opening and closing the valves of the set in their proper order. A special power cylinder operates the master piston and the timing is accomplished by needle valves which adjust the flow of pressure to the power cylinder. The stroke of the master piston is automatically reversed at the proper time.

A hand wheel attachment provides for manual operation when desired. No interlocking is necessary as the ports of the master cylinder ensure definite sequence.

The latest contribution to automatic operation is an automatic control system designed by Mr. Jas. S. Kennedy of the Standard Gas Light Company of New York and now being developed commercially by the Bartlett Hayward Company of Baltimore, Maryland. A trial machine of this type has been in successful operation since October, 1921, at the New Amsterdam Gas Company's works, Ravenswood, Long Island City, of which the writer is superintendent.

This apparatus consists of a timer, a valve operating mechanism and a special interlocking system. The timers can be located in a central position for convenient group control of several sets by one operator. The timing, control and interlocking is electrical but the motive power of operating the master valves of the hydraulic system is hydraulic. The valve operating mechanism can be attached to existing forms of hydraulic control nests.

Several distinctive features ensuring safety and flexibility of control are claimed for this apparatus and proved out during the trial. The timing is on a time basis in quarter minute units and the cycle or any event therein can be quickly and easily adjusted while running. The time arm moves in front of a large dial and indicates the progress of the cycle. Manual operation can be accomplished at any time by simply operating the hand levers without any pre-

vious preparation. The interlocking system is attached directly to the valves of the set and not to any intermediate agencies for moving the valves. This ensures positive safety as no valve can operate unless the movement of the previous valve has been successfully accomplished.

If a valve fails to open or close at its appointed time the machine shuts the set down automatically, places the valves in a safe position, and sounds an alarm signal. The set can also be instantly shut down to a safe position at any time by pushing a button on the timer or butttons located at entrance to building or elsewhere.

The set can be run manually from the control position by push buttons on the timer. This distant control feature is very useful in taking care of odd cycles after fire cleaning, coaling, etc. A more detailed description is given in the Appendix.

When this machine was installed at Ravenswood, a U. G. I. Contracting Company's automatic was also installed on another set in the same building. The attitude of the working force and foremen in the house was decidedly skeptical and this phase of the experiment presented an interesting study.

The U. G. I. Machine was started first, running one of the 11 ft. sets, the whole operation in charge of the installing company and the superintendent's force. Several of the more intelligent gas makers were designated to watch the action of the apparatus and were gradually instructed in its apparent mysteries.

Soon these men and their foremen began to realize that there was really something to it and that the set was running hour after hour, without any effort on their part and apparently making as much gas, consuming as much coal, and using as much oil as formerly. Even though the gas makers could not fail to realize the fact that the successful operation of these automatic machines would, no doubt, eventually mean less jobs, they did not lose any time in getting familiar with the mechanism. They were very soon converted from skeptics to boosters and keen competition was created among them. It was considered an honor to be placed in charge of one of these machines.

The Kennedy machine was put in operation soon after the U. G. I. and the same outcome resulted. The transformation of the foremen was even more complete than that of the gas makers as they originally appeared to be more skeptical. They now are firmly convinced that automatic operation is the correct method and wonder how they have done without heretofore.

Up to the present time these two machines have operated continuously, with only very slight interruptions, due to minor mechanical troubles.

It is our opinion that a substantial saving in operating labor will result from the adoption of automatics on all of the machines. It would be practical, in so far as we can now see, to have one man take care of four sets operated by automatics. Of course, the supervision would necessarily have to be of a higher order than under hand control.

Due to the fact that only two sets out of a total of sixteen are on automatic operation the writer is not prepared to say whether there is a positive saving in gas making materials by this method of operation. It is, however, our opinion that the chief saving, over manual operation, would be in the labor item. Of course in a plant where slipshod methods were the rule, automatic control would

no doubt make a substantial saving in coal and oil.

It seems reasonable to believe that water gas sets accurately timed, from hour to hour, would give better results all round, than when timed by hand.

Some of the makers of this type of apparatus actually claim that a positive saving of oil and fuel has resulted after their apparatus has been installed. The writer is not prepared to give any data on these claims.

If the best type of gas maker, the one who conscientiously performs his work, were always available, it is doubtful whether automatic operation would have a positive advantage over manual operation, except in cases when extremely short cycles were used or there was a shortage of labor. A good gas maker can see the necessity of making certain small changes in the cycle, and can make them at once. While it may not sound reasonable, individual gas generating sets need individual handling and the better type of gas maker appreciates this and operates accordingly. This special or individual attention of different generating sets would hardly be possible with automatic apparatus. Then, too, automatic apparatus requires specially trained supervision and it is hardly to be expected that all companies could obtain an ideal type of man who would be able to properly supervise such apparatus and at the same time be a good gas maker. It seems, in the writer's mind, that when it came to a decision between manual and automatic operation local conditions would in a large measure be the deciding factor. We all must aim for the best average conditions of operation and then be guided by that method which will best give them to us.

This paper is intended to be simply a review of what has been done, and is being done at the present time in the way of automatic operation of water gas generating apparatus.

The writer feels that while a great step forward has been made in the art of water gas manufacture, much more remains to be done. These excellent and well designed machines are one more step forward in our branch of engineering and I feel if all of us could actually see and observe them in operation, we would be much benefited. Perhaps we would be given an added impetus to do more and more thinking and experimenting so as to eventually reach the ideal in the art.

The writer wishes to express his great appreciation for the kindly and helpful cooperation of all of the makers of automatic control apparatus for water gas sets.

If this paper has contributed anything of interest to the Association and its members the writer will be very grateful.

In the following Appendix is set forth the detailed descriptions, with illustrations, of the four types of automatic control apparatus now in succesful use. These descriptions have been supplied by the manufacturers.

APPENDIX

Description of The U. G. I. Thermo Automatic Control for Water Gas Sets

The U. G. I. thermo automatic control for water gas sets consists of a motor-driven machine for timing the operation of hydraulic cylinder on the different valves of the gas set. By means of a thermal couple in the superheater, the proper length of "blow" is adjusted and maintained to give a uniform heat condition for making gas. The valves as they open and close operate an electric alarm

and signal system, which shows the position of all the valves at any time during the cycle.

Fig. 1 shows the control enclosed in the casing which protects it from dirt and injury.

Fig. 2 shows in detail the motor attached to the reduction gears, through which the motor speed is reduced sufficiently to operate the train of gears on the cam shafts.

Fig 3 is the control with the hood removed, showing the timing mechanism. The motor with the reduction gears is contained in the casing forming the base of the machine.

Through the train of gears power is applied to the gear meshing with the different steps of the cone gear, which in turn drives the two cam shafts. By means of the cone gear, the control may be timed for different cycles as desired.

Fig. 1

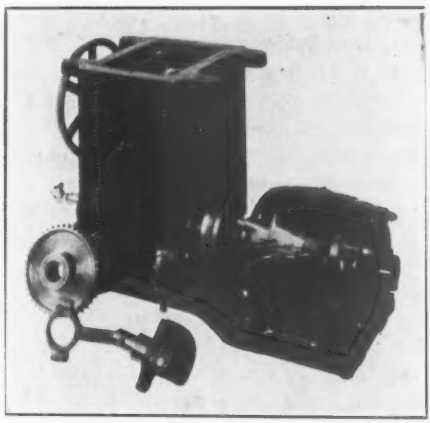

Fig. 2

The two cam shafts are driven from the cone gear train and revolve at the same speed. Mounted on these shafts are five sets of cams, whose functions are to move the bell crank levers which open and close the timing valves. The upper set of cams open and the lower set close the valves.

The timing valves control the flow of water to hydraulic cylinders mounted on top of "The U. G. I. Master Valve" nest. This valve nest directs the water to the hydraulically operated generator and carburetor blast valves and to the stack, oil and hot valves.

The cams which operate the stack valve are fastened rigidly on to the cam shafts. The other cams are adjustable on the shafts, so as to allow their being set relative to the closing and opening of the stack valve. By this means the generator blast can be used to purge out the set before a "blow" or the oil can be put into the carburetor any time

after going on to a "run" and shut off any time before going on to the "blow" and so forth.

The hot valve cams are further adjustable so that a "split run" can be made and the proportion varied to suit any condition required.

Attached to the end of each cam shaft is a dial, graduated into per cent of the complete revolution. By means of a locking flange, these dials can be set so as to divide the cycle into any proportion of "blow" and "run" that is desirable.

The upper arm of the bell crank is in contact with the cam surface which gives the motion to the travel of the pilot valve stem. The upper set of bell cranks, when they fall into the notch of the cams, pull the valve stem in the direction to open it by means of a spring attached to the end of the lower arm. The lower set of bell cranks pull the stem in the opposite direction. These springs tend to hold the bell crank arm in contact with the cam surface until the gas set is to be placed in a shut down position for the purpose of charging with fuel or for cleaning.

When it is desired to place the gas set in a shut-down condition, that is to have the stack valve open, the blast valves and oil valve closed and the top hot valve open and bottom one closed, this is performed by means of the shut-down lever. When this lever is thrown over, it moves the stems of the timing valves to the proper position to shut the set down. When any valve is in an open position, and should be closed, or vice versa, the shut-down lever forces the valve stem against the spring of the bell crank and lifts the arm in contact with the cam off from that surface.

In order to record the number of

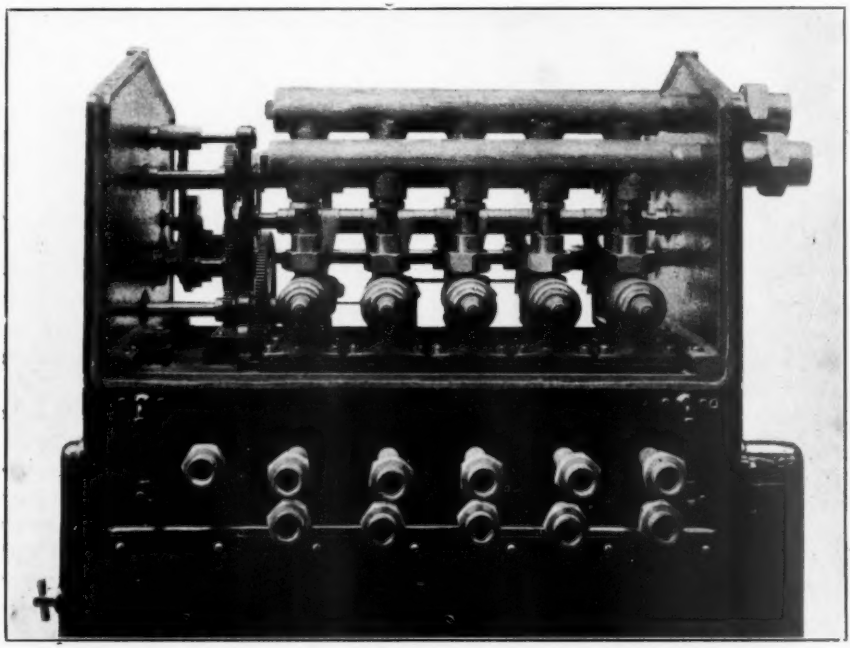

Fig. 3

"runs" made, between fuel charges or between clearings, an automatic counter is mounted on the outside front of the control. This counter is arranged to give the total number of "runs" made by a control and can also be set to record the number for any specific period.

To safeguard against any of the valves of the gas set being opened or closed at the wrong time, an interlocking device is placed on the master valve nest. By means of this device, the hand levers attached to the different valves of the nest must operate in their proper sequence. Having this interlocking system in the valve nest a valve cannot function out of order, even though some part of the automatic control should break or become loose. The oil valve on the set is operated direct from the timing valve of the control and therefore has a separate interlocking device with the pilot valve connected to the stack valves.

In the main electric circuit to the motor are two switches, one operated by a cam on the cam shaft, the other shunted around this switch and operated by a relay solenoid. The relay circuit is closed by means of the indicating galvanometer arm of a Leeds and Northrup signal light recorder.

A thermal couple placed in the superheater, so as to record as near as possible the temperature condition in the carburetor, is connected to the signal light recorder. By means of this couple the fire condition is recorded at all times during the cycle.

The length of "blow" as adjusted by means of the cam shafts, on the control, is a fraction shorter than that necessary to bring the heats up to the proper operating temperature for the gas set.

When this period of the "blow" has been completed, the motor circuit is then broken by the switch on the cam shaft, and the motor stops. If the correct temperature is not recorded by the indicator arm the motor remains idle, not revolving the cam shafts and the "blow" continues. As the temperature rises and finally reaches the proper degree, the relay circuit is closed, by the switch of the indicator arm, which starts the motor revolving the cam shafts, and changes the valves over from a "blow" to a "run." However, if the temperature in the superheater is correct at the end of the "blow" period the relay circuit is closed, by the indicator arm switch, and the motor continues to run, thereby operating the automatic control.

Mounted on each valve of the set is a double throw electric switch, which is closed at both ends of the valve travel. These switches are connected to the signal light cabinet in such a way that the position of each valve is at all times indicated by illuminated letters on the ground glass front.

If for any cause the switch remains open due to the valve not properly working, an alarm signal is given and the particular light in the signal cabinet is not illuminated. This shows the operator at once where the trouble is and the position of the valve which has failed to work.

In order that the alarm signal will not be given during the short time of travel for the valve, between the ends of the stroke, a hold-over relay is placed in the circuit between the switches and the alarm. This relay holds the circuit opened for a period a little longer than the travel of the largest valve. If the valve should fail to complete its travel the relay circuit is then closed and the alarm given.

Fig. 4 shows a typical layout of the

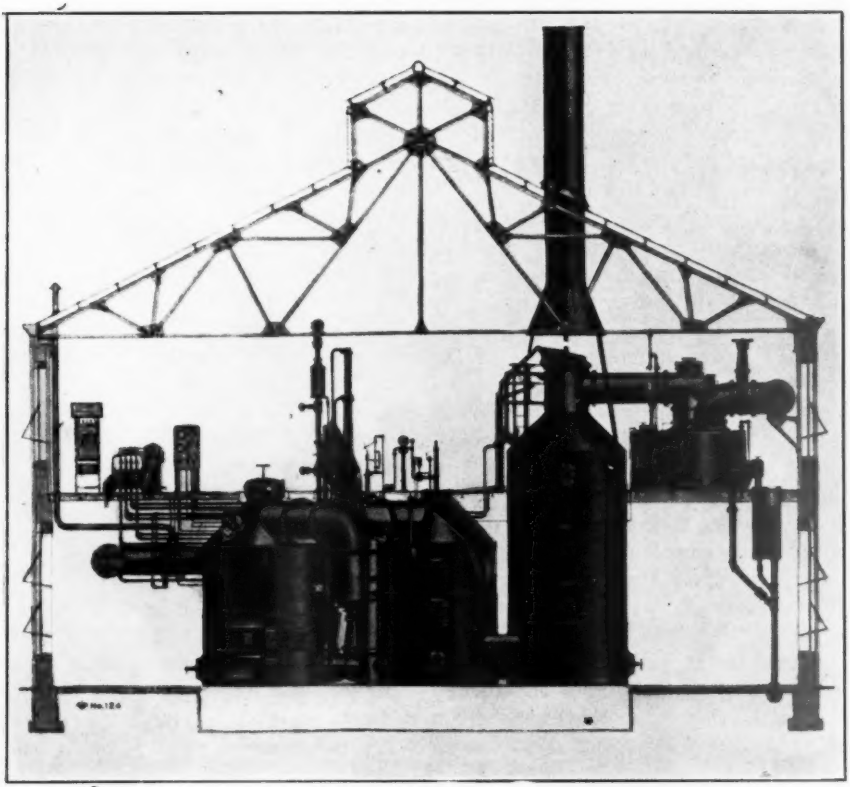

Fig. 4

automatic control, lighting cabinet and different hydraulic valves on a typical U. G. I. water gas set. There is shown under the floor, in detail, the different pipes leading from the master valve nest to the hydraulic cylinders, mounted in their proper place to operate the valves of the set.

Automatic Water Gas Control (Patent Allowed) as Built by The Gas Machinery Co., Cleveland, Ohio

Construction. The automatic water gas control as illustrated, Fig. 1 and Fig. 2, consists simply of the Gas Machinery Company's standard hydraulic control valves and hand operating levers, to which has been added a half horse power electric motor to run timing discs and operate these same hand operating levers automatically. The position of the hand levers always indicates just what is going on and no complicated signal system is necessary.

The whole equipment is a self-contained unit and a lever is provided for instantly changing from hand operation to automatic operation, or from automatic operation to hand operation.

The automatic control unit includes the valve control nest, which is necessary to operate the set by hand or auto-

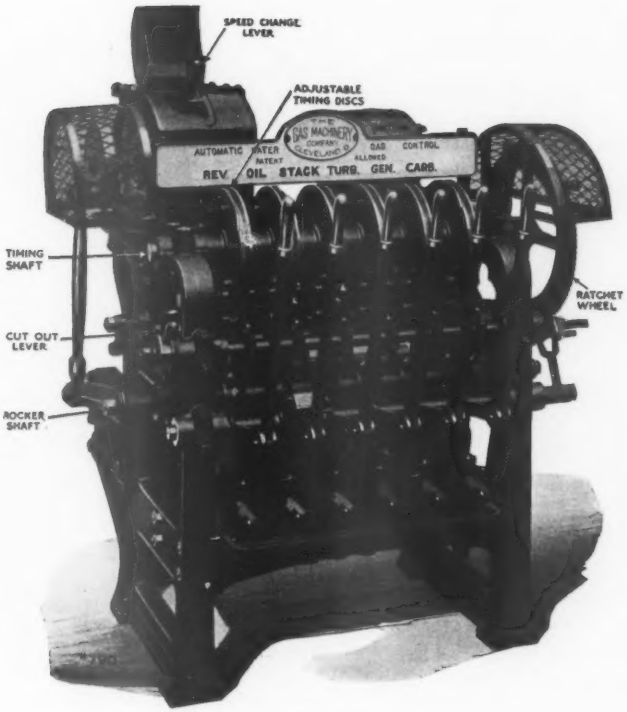

Fig. 1

matically and no additional valve nest, intermediate operating medium or mechanism or other complicated equipment is required.

The time of the cycle can be changed while the control unit is running, and can be set for about 4, 5, 6, or 7 minutes. On a 4 minute cycle, for instance, there may be a run of 2½ minutes and a blow of about 1½ minutes and on a 7 minute cycle there may be a 4 minute run and a blow of about 3 minutes.

The time of opening and closing the operating valves can be varied to suit the conditions, and the control will take care of blow runs, air purging, split runs, all up runs, or any other desired methods of operating.

In addition to the valves indicated on the name plate of the automatic water gas control, the generator steam valve, carburetor blast control valve, steam purge valve for oil spray and steam throttle valve of turbo blower are either interlocked with the valves indicated on the name plate of the automatic water gas control or separate timing discs and operating levers are provided for these additional valves as may be necessary to suit the local conditions.

The unit can be furnished with 5, 6 or 7 pairs of timing discs and 5, 6, or 7 control valves and provision is also

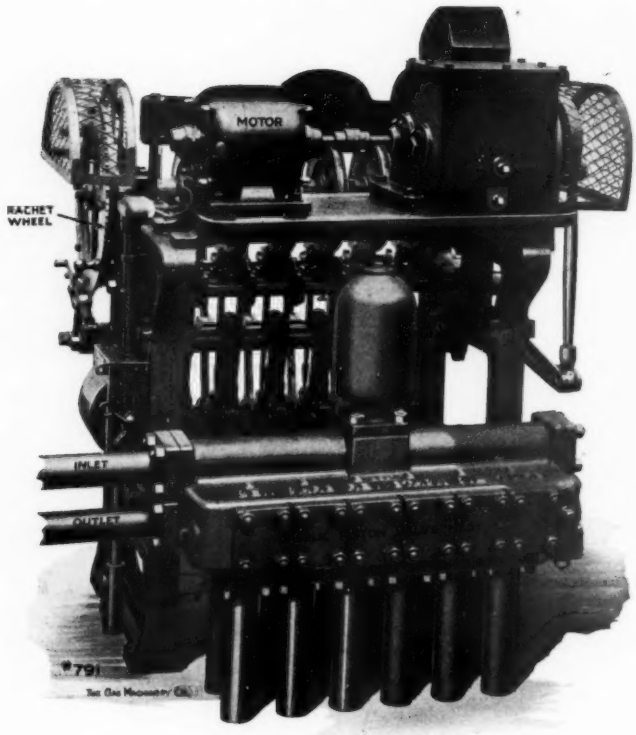

Fig. 2

made whereby additional pairs of timing discs and control valves may be added for waste heat boiler and other special operations.

There is a recording counter on the automatic unit to indicate the number of runs made.

The Gas Machinery Company's automatic water gas control does not take up any more floor space than a hand-operated hydraulic valve box as there are no auxiliary parts such as pilot valves, cylinders, connections, operating medium or delicate and complex equipment.

Operation. While there is a distinct valve economy in installing the automatic control as one man can supervise the operation of more than one set of apparatus, the chief advantages are due to the fact that the automatic control will perform every function at an exact time, which it is humanly impossible to do.

By having the operations all exactly on time by means of the automatic control the time of the cycle can be shortened, thereby reducing the clinkering time, maintaining more uniform heats in the generator, which heats can be properly controlled and, therefore, requiring less generator fuel.

Less oil is required due to more uniform temperature of checker brick.

Longer life of refractory materials is obtained due to more uniform temperature in fuel bed and carburetor.

The capacity of the set is increased due to less time required for clinkering, less time required to operate the valves and uniform conditions due to automatic operation.

Operating a water gas machine by hand it is impossible for the operator even with special clock and timing devices to operate the valves at the proper instants and in close enough sequence to obtain the best results.

Operating automatically, the operator does not have to keep a lengthy operating sheet covering all the times he turns on and turns off each valve as well as a number of other operations, as he simply reads the recording counter on the automatic unit at the end of a shift to show the number of runs made and he can, therefore, give all of his attention to obtaining the highest efficiency from the set as he has very little bookkeeping to do and no long record sheets to fill out as is the case with hand operation.

The following advantages are, therefore, obtained by the use of the automatic control:

A. Less labor of supervision is required and clinkering time is reduced due to more exact operation.

B. Less generator fuel is required as a short cycle maintains the fuel bed at a more constant temperature for best uniform production and soft clinker.

C. Less oil is required due to more uniform temperature of the checker brick and consequent greater efficiency in gasifying the oil.

D. Longer life of refractory materials is obtained due to more uniform temperature throughout the fuel bed and the checker brick.

E. The capacity is increased and more uniform due to less time required for clinkering, to saving in time of operating valves, and to uniform conditions due to automatic operation.

F. Any operating condition may be continued or accurately reestablished at any time.

The Gas Machinery Company also builds a Special Automatic Control that has the following *Safety Features:*

The stack valve of the water gas set opens and all of the other valves close automatically, if:

(1) The water pressure operating the hydraulic cylinder fails;

(2) Any vital valve fails to open or close as promptly as it should.

Description of Western Gas Mechanical Control

The single piston valve in the power cylinder replaces the five or more valves of a Critchlow valve nest or water table. The power cylinder is located below the floor and from ports cut in the cylinder, pipe lines run to the various hydraulic cylinders which operate the valves of a water gas set. These ports are cut in the proper sequence of the average operating cycle and consequently the entire device is interlocking and no valve can be caused to operate at the wrong time.

Hand Operation Only. For operating by hand only a simple rack and pinion floor stand with indicator plates to show the position of the water piston makes the complete hand machine shown in Fig. 1. There being one stuffing box and one valve to move, the operator exerts very little physical effort in operating a set and cycles as short as three minutes can be maintained by hand operation. The change from a straight run

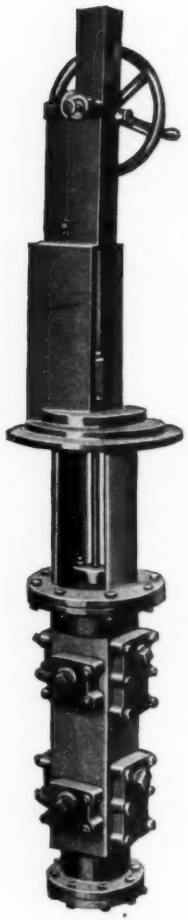

Fig. 1

to a purge run or to a blow run involves only the opening of two valves located on the port covers connected to the generator blast and generator steam ports.

Mechanical or Automatic Control: The change from a simple hand control machine to an automatic is accomplished by removing the floor stand with its rack and pinion and substituting a control cylinder operated by oil and controlled by needle valves. (Fig. 2 shows automatic control cylinder replacing floor stand above floor.) The piston in this control cylinder is connected by means of its piston rod to the valve stem of the piston valve and the speed of the piston can be varied during each three-quarters of inch travel by opening or closing the needle valves which control the flow of oil away from the cylinders.

The length of time of the entire cycle or any small portion of the cycle can be varied by as small amount or as large amount as the operator may wish. The needle valves are designed to produce a change in the volume of oil flowing through them which is proportional to the rotation of the valve stem. If the operator wishes to increase the length of the blast he would screw down on one or more needle valves which control the movement of the piston during the blast period. This would lessen the volume of oil flowing out of the control cylinder and increase the length of time during which the piston moves from the opening to the closing of the stack valve. The wider open the needle valve is the faster the piston will move over the ¾" of space which this valve controls. (Fig. 3 shows the oil and water circulation and method of timing control.)

The exact location of the piston valve with reference to the ports is shown by the indicator which moves up and down over two plates on which the locations of the ports are accurately marked. The operator can tell at a glance the part of the cycle that the gas machine is on and the next change which will take place. This serves as a guide when operating by hand. In order to operate the mechanical control by hand it is only necessary to

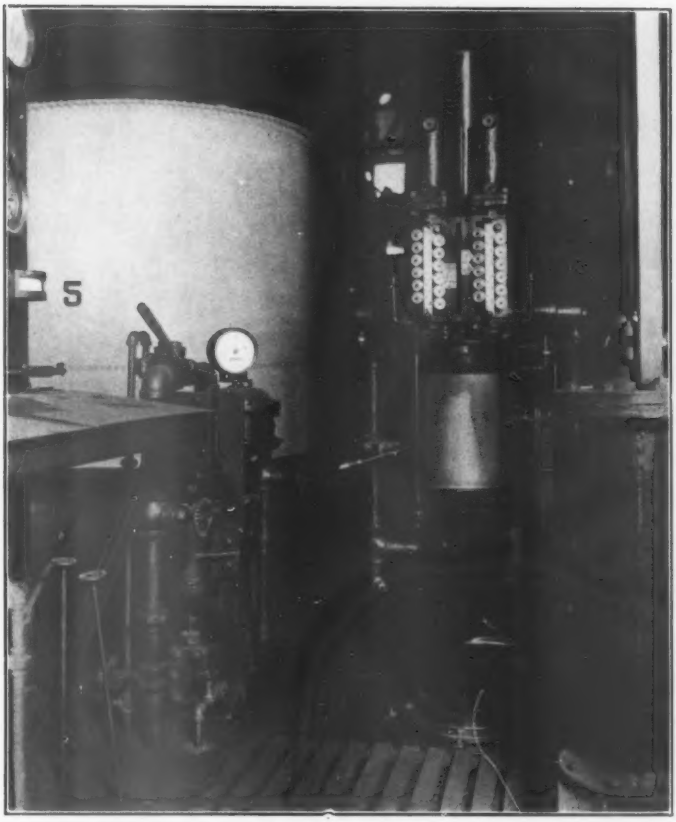

Fig. 2

open a by-pass valve which permits a free flow of oil from the top to the bottom of the cylinder and then raise and lower the valve by means of the hand-wheel connected to a rack which forms part of the connection between the piston rod and the valve stem.

The reversal of the piston in the control cylinder at the ends of its stroke is accomplished by means of a pilot valve. This pilot valve is shifted by two small pistons connected to ports which are uncovered by the water piston at points of extreme travel up and down. (Fig. 4 shows an installation of nine (9) automatic controls operated from a single power pump.)

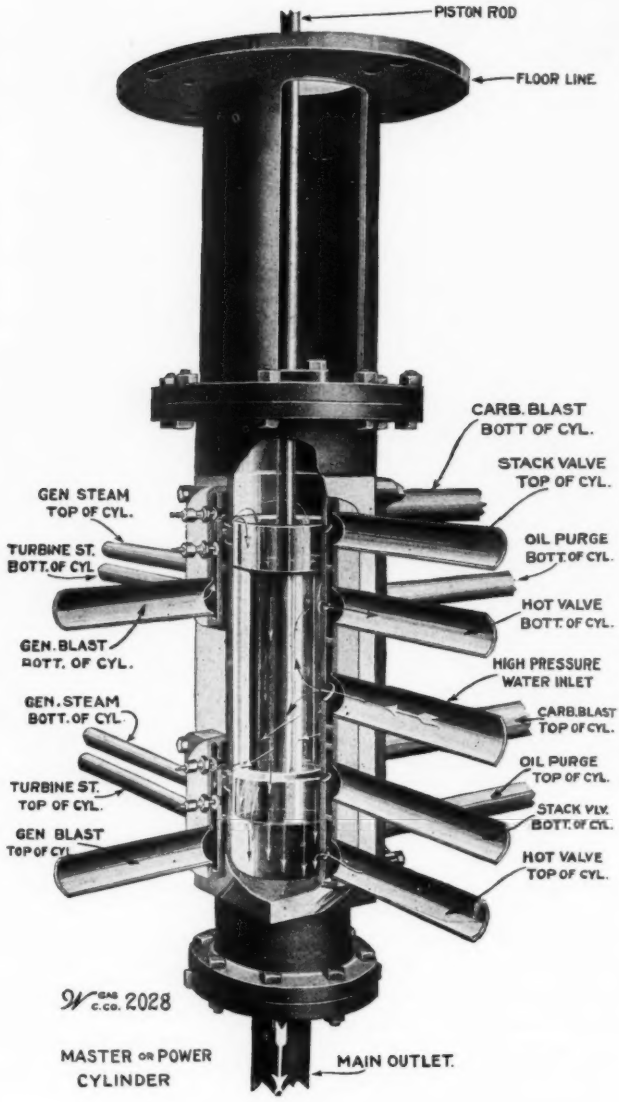
PISTON ROD
FLOOR LINE
CARB. BLAST BOTT OF CYL.
STACK VALVE TOP OF CYL.
GEN STEAM TOP OF CYL.
OIL PURGE BOTT. OF CYL.
TURBINE ST. BOTT. OF CYL
HOT VALVE BOTT. OF CYL.
GEN. BLAST BOTT. OF CYL.
HIGH PRESSURE WATER INLET
GEN. STEAM BOTT. OF CYL
CARB. BLAST TOP OF CYL.
OIL PURGE TOP OF CYL.
TURBINE ST. TOP OF CYL.
STACK VLV. BOTT. OF CYL.
GEN BLAST TOP OF CYL
HOT VALVE TOP OF CYL.
W GAS C.CO. 2028
MASTER OR POWER CYLINDER
MAIN OUTLET.

Fig. 3

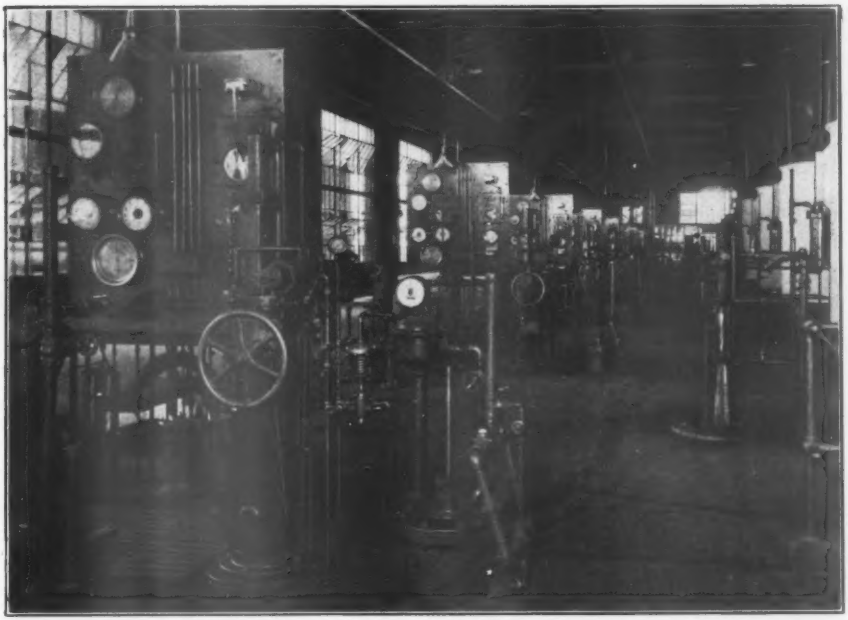

Fig. 4

The Kennedy Automatic Control for Water Gas Sets Made by The Bartlett Hayward Company

This apparatus consists of a timer, a valve operating mechanism and a special interlocking system. The timers of several sets can be located in a central position for convenient group control of several sets by one operator. The timing, control and interlocking is electrical but the motive power for operating the master valves of the hydraulic system is hydraulic. The valve operating mechanism can be attached to existing types of hydraulic control nests.

Figures 1 and 2 illustrate the timer which has a vertical dial about 16″ diameter and a controller arm which moves over this dial. The dial is graduated from zero to ten minutes in quarter minute units so that cycles up to ten minutes can be used. The controller arm is driven by a motor geared down to an intermittent motion, whereby the arm moves forward one graduation every quarter minute.

The timing being on a time basis is very convenient and the length of the cycle or any of the events within the cycle can be quickly and easily adjusted while running. The position of the controller arm as it moves around the dial always indicates the progress of the cycle.

The cycle or beginning of the blow starts at the graduation marked zero on the dial and the other events, such as changing from blow to run, turning the oil on and off, reversing the hot valves and the end of the run, are timed by adjustable contact pieces set around the dial in their proper time positions. When

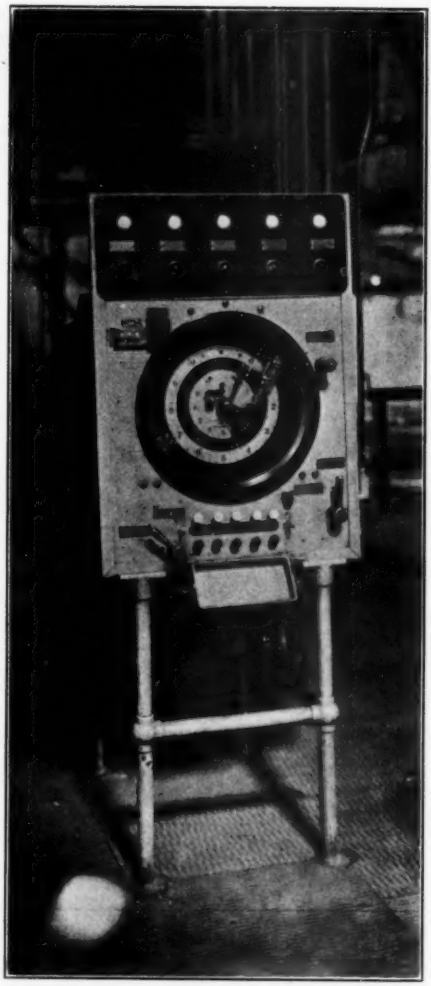

Fig. 1

the arm, with its contact fingers, moves around and makes contact with each of these pieces in turn, the events, such as changing from blow to run, turning on the oil, etc., take place at the time marked on the dial where the contact piece is set. When the arm reaches the "end of run" contact, it moves forward quickly to zero and the next cycle is started.

Any combination of blows and runs, up to a total cycle of ten minutes, can be taken care of and the other events, such as the oil on and off, and splitting the run can be arranged for anywhere between "beginning of run" and "end of run." For example, one setting could be as follows: length of blow 1¾ minutes, run 3½ minutes, oil on ¼ minute after run begins (or immediately after purge cap is closed if desired), up run 1 minute, down run 1¾ minutes, up run ¾ minute, oil off after 2¼ minutes.

By setting a switch lever marked "purge" the generator valve will open at the end of every run before the stack or purge cap opens. After the purge cap opens, the carburetor blast opens gradually. If the purge switch lever has been set in the "no purge" position, the stack would open first then generator blast, followed by carburetor blast. If there is a waste heat boiler, the valve of which required manipulation at the beginning and end of the blow, the boiler valve will open after the carburetor blast opens and then the purge cap will close. In this case, at the end of the blow the purge cap will open first, next the boiler valve will close, followed by the closing of the carburetor, generator blast and purge cap in the order named. The "oil on" and other events will follow as explained above.

The sending of the blast products through the waste heat boilers can be omitted if desired by setting a switch in the proper position.

By moving another lever at any time during the cycle, the set will finish out the cycle and shut down at the end of the run so that coaling or fire clinkering can be attended to. An "all up run" switch, when thrown, prevents the reversal of the hot valve until the switch

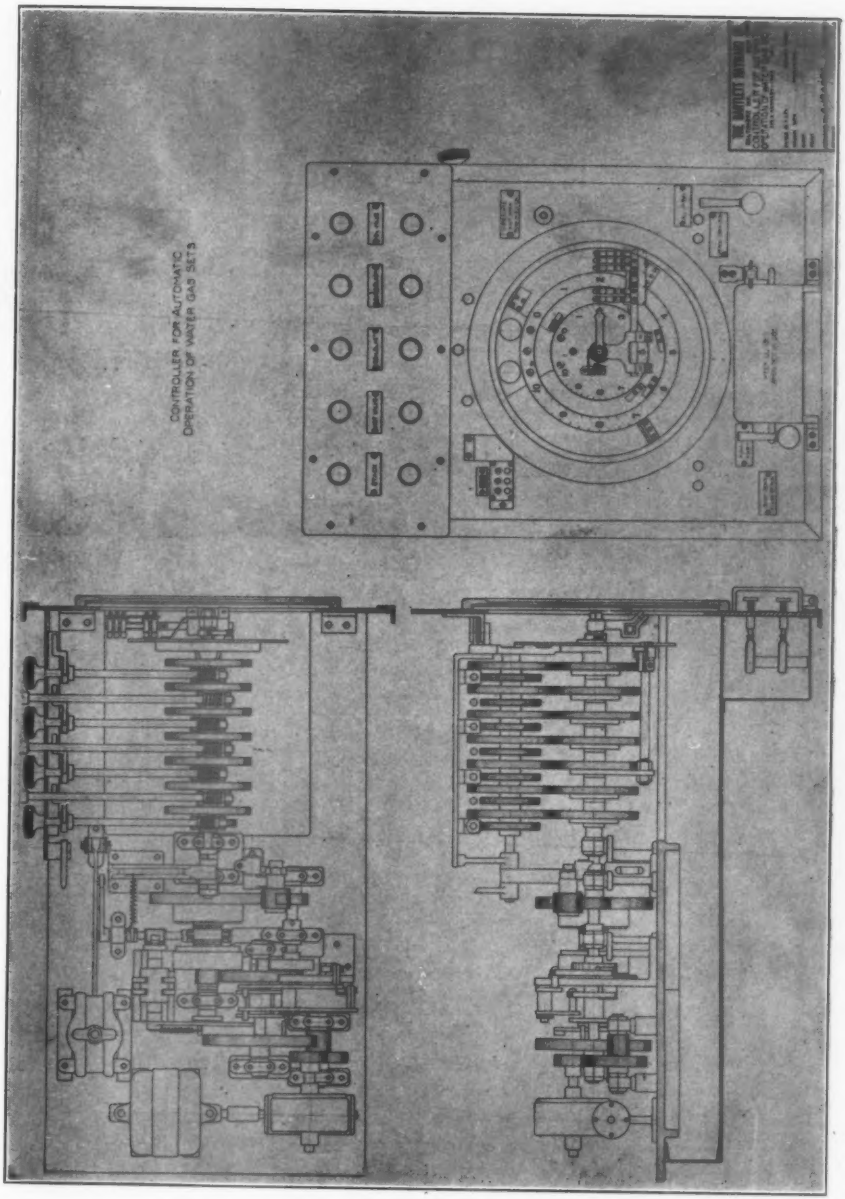

Fig. 2

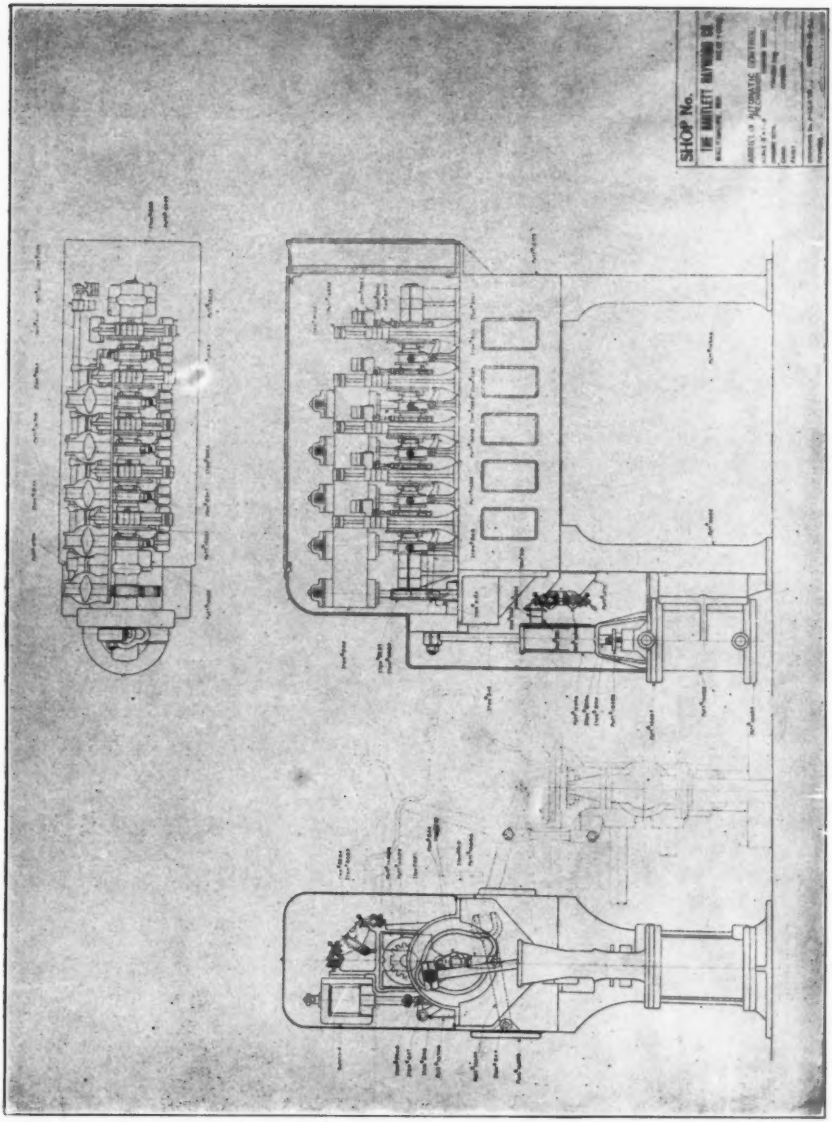

Fig. 3

is changed again. The total number of runs made and the number made between cleans are automatically registered on a counter.

After coaling or cleaning, an extra blow or a run different from the dial setting can be run manuallly by push buttons, a white one for opening and a black for closing each valve. If you pushed the wrong button or several together no harm would be done. They are all interlocked so that only that which is safe to be done will take place.

When the machine is running, a glance at the dial tells exactly how far the cycle has progressed and what events are due next.

The timer can be located anywhere in the generator house so that group control of several sets by one man can be conveniently done from a central position.

The operating mechanism (Fig. 3) is located alongside the hydraulic control levers. This mechanism is adaptable to any of the standard forms of control nests. When the timer arm makes contact with a contact piece, the proper control lever is automaticallly raised or lowered. This is accomplished by a set of positive jaw clutches which are selectively engaged to a common shaft. The shaft is rotated by a hydraulic cylinder, thus lifting or lowering the lever or levers which are selected by the timer.

The design of the mechanism is such that the hydraulic control levers can be manually operated when desired without any previous change of cocks, levers, etc.

Interlocking switches of a very rugged type are attached directly to each valve of the set and the operating circuits are routed through these switches so that correct sequence is positively secured.

After a contact has been made by the timer arm, for opening or closing a valve, a test is automatically applied by the timer to determine whether the valve has properly opened or closed, i.e., the *proper execution of the order.* If the valve has not properly opened or closed as required, the next step is not made but instead, the set is automatically shut down to a safe condition and an alarm sounded. The timer stops operation and the arrested position of the control arm indicates the offending valve. A safe condition of shut-down is always assured, no matter which valve is out of order or when the shut-down takes place.

A quick emergency shut-down can be effected at any time during the cycle by simply pressing a button on the timer. Similar buttons are wired to the building exits if desired for use in emergencies.

Aside from the extreme flexibility of operation, the outstanding feature in the design of this apparatus is its absolute safety in the *prevention* of accident due to incorrect or faulty valve operation. This is secured because its interlocking system is basically correct and is built, figuratively speaking, on the *execution* of the command itself, rather than on the command as is common practice. By attaching the interlocking system to the final act accomplished, viz., the movement of the valve on the set, instead of the intermediate agencies which are intended to move the valve, we can make the movement of one valve absolutely dependent on the successful movement of the preceding valve. This is the only way.

Standardization of Capacities of Consumers' Meters

THE Committee on Standardization of Capacities of Consumers' Meters has been instructed to recommend to next year's session of the Technical Section a standard schedule of capacities to guide the user in future purchases and the maker in changing his designs as opportunity offers. Manifestly, the basis for any proposed standard must be the capacities now generally purchased. Information on this head is wanted promptly from every member company. Therefore, write at once to Association Headquarters for the proper form on which to enter your reply. Your assistance in the very important task assigned to the Committee will be greatly appreciated.

Committee on Standardization of Capacities of Consumers' Meters,
WALTON FORSTALL, *Chairman.*

(Information desired by the Committee on Standardization of Capacities of Consumers' Meters. When filled out mail to Walton Forstall, 1401 Arch St., Philadelphia, Pa.)

SIZES OF TIN CASE METERS PURCHASED OR DESIRED

* * * * *

.....1923

Name of Company .....

TIN CASE METERS NOW PURCHASED

(1) Case or Screw Size	(2) Ordinary or Prepayment	(3) Capacity Cu. ft.per Hr.	Remarks
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

(1) This column refers to the old numerals always used when designating meters as 5-lt, 10-lt, etc.

(3) Capacity as measured according to A. G. A. standard adopted in 1922, viz. 1.25 times the Air Capacity (see page 629, October, 1922, A. G. A. Monthly).

If you do not believe the capacities as now purchased by you are those best suited to your situation, note below capacities you would like to be able to buy.

TIN CASE METERS DESIRED

(1) Case or Screw Size	(2) Ordinary or Prepayment	(3) Capacity Cu. ft.per Hr.	Remarks
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

Signed .....
Title .....

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